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GAS JOURNAL

LIGHT ✦ HEAT ✦ POWER ✦ BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

VOL. CLXXI. No. 3251.] LONDON, SEPTEMBER 2, 1925. [77TH YEAR. PRICE 1s.

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VOL. CLXXI., No. 3251.] WEDNESDAY, SEPTEMBER 2, 1925. [77TH YEAR.

EDITORIAL NOTES.

The Complement of the Coal Inquiry.

DURING the next nine months, there is to be an inquiry into the economic conditions of the coal industry; and the exploration is to extend from the top to the bottom, to the effects of the methods of operation, and to the possibilities resident in suggested changes. The influence of coal prices on other industries is also to be considered. It is, in fact, an investigation of big national import that has been put in hand. But whither it will all lead, we have not the shadow of a notion. There must be present contentment in watching developments, and later in examining the likely or actual issues. A curious, but fortunate, thing has happened, which induces a suggestion. Before the trouble over coal came to a critical head, the Government were considering the electricity development scheme, and were intending to take action on more or less competent investigation, including, by the way, a proposal to finance the electricity scheme by an appropriation of the surplus of the Road Fund. This represents the proceeds of a tax on motorists, imposed for the specific purpose of maintaining and improving roads in view of the increased wear and tear and use which modern traffic has inflicted upon them. The contemplated diversion is said to be only temporary. It means locking the money up for a considerable time, and so depriving of its use the particular object for which it was raised and earmarked. This is an unfair proposal in more senses than one. It is unfair to other industries, whose services to the country extend over a far greater number of years than is the case with electricity supply. It is unfair to motorists, who, if the money is not immediately required for the purpose for which it was raised, have a right to expect that it should be utilized in reducing the tax. However, this is a matter over which motorists will organize their forces in opposition.

Let us get to the point of present interest. The Government are holding an inquiry into the economic circumstances of the coal industry, with the view of endeavouring to improve them, and to place the industry in a position to compete with other coal-producing countries. Why should not the Government follow up this investigation by a similar thorough inquiry into the best means of conserving coal by co-ordinating the use of the available supplies of fuel in the country? The country has three great coal-using industries, two of which supply the community and industries with light, heat, and power. The third industry supplies coke for metallurgical work, is beginning to do so for other purposes, and it is now doing a fairly considerable business in supplying gas in bulk to the undertakers who distribute gaseous energy in our urban areas. Notwithstanding the obvious interrelationships between these industries, and how largely the development of those interrelationships could be made to contribute to the national economy, the Government have been proceeding blindly—even obstinately—towards the single objective of improving the electrical system of the country (which is developing on good lines without their assistance) instead of having regard to the economic interconnections which could be promoted between them. The Government have not considered their policy in this respect in any way, much less comprehensively. They simply found something had been handed on to them by their Labour-Socialist predecessors; and they adopted it, without examining it to ascertain whether or not electricity is only one aspect of a very large problem. And that is all it is.

The Government have altogether omitted from their programme the question of heat. They have not considered that in this country 38,000,000 tons of coal are used for domestic purposes and many more million tons for industrial service. They have not considered that the whole of that domestic consumption is used for heating, and that the greater proportion of the huge industrial consumption is expended for similar purpose, and not for power. They have not troubled their minds as to whether the greater part of that coal can be economically used to better advantage. They have therefore not considered which of other means of utilization is the most economical in the interests of the country. They have not taken account of whether or not smokeless fuel can be supplied from one industry to another. Nor have they explored the question of whether electrical power in all circumstances of requirement and use is economically so far in advance (which it is not) of other means of providing power. Manufacturers know more on this score than the Government; and the Government cannot teach them anything in this regard, nor will the Government turn them from the utilization of internal combustion engines and steam engines when the condition of load or availability of operating agent makes their use preferable. Not any of these matters have been inquired into by the Government. Furthermore, they have in train a Smoke Abatement Bill. In relation to this, they have not in any way explored the practical agents and the possibilities. They have not considered in which direction lies economy of the national industrial, and household orders. All these matters are to the Government very vague and amorphous. They have taken little or no interest in them; and yet, unequipped with information upon them, they are proceeding with the electricity development scheme. This is strange procedure on the part of a responsible Government such as ours.

At first it was unemployment which was put forward as the excuse for trying to push electrical development at a faster rate than it is going. Development in that regard cannot proceed quicker than it is doing at the present time, and is warranted by circumstances. The fact that the Government have deferred the scheme to next session indicates that they now realize the matter is not urgent, and that it would not, however rapid the development, make any great difference to unemployment. And all who have dealings with light, heat, and power, and have intimate knowledge of the potentialities of the agents and the needs of the industries of the country, are well aware that there is nothing pressing about the electrical scheme. What is of greater importance is that the Government should see the error of their ways in limiting their view, interest, and fostering care to one power agent, which is also making a bid to become a recognized heating agent, although for that purpose prodigal use is made, through poor generating efficiency, of our fuel resources. For these and other reasons, why should not the Government drop their electricity scheme, and give a thoroughly good finish to the coal inquiry by providing the complement to it of an inquiry into the utilization of coal for the provision of heat and power by those means which would truly promote the economic interests of the country?

The True Aims of Science.

ALL who are concerned in scientific work will feel a large indebtedness to Prof. Horace Lamb, F.R.S., who is a distinguished mathematician, for taking the opportunity in his Presidential Address to the British Association of doing much what Huxley did in 1887—remind the world of the true aims of science. We are apt to get those aims into wrong focus by accepting without penetration the teachings and the doctrines of individuals, and even widely approved formulæ, regarding the relation of science to the affairs of everyday life. What, asked Prof. Lamb, is the real purpose of science in the comprehensive sense, what the common inspiration, the common ambition behind the enthusiastic and sustained effort in many directions, as, for instance, indicated by the meetings of the Association's numerous sections? Answers to these questions are necessary to implant in the mind a proper conception of the functions of science. To those of us who are so largely engaged in the work of industrial engineering, and have long revered the formula which stands in the forefront of the constitution of the Institution of Civil Engineers, and which tells us that the aim of science is "to subdue the forces of Nature to the service of man," it comes almost as a shock to have it brought home to us keenly and forcibly that it does not worthily convey what has been the real inspiration of discovery through the ages. And when Prof. Lamb compels us to think over the matter, we have to confess that the aim of science is not the subjugation of the forces of Nature, but, by exploration, to develop the gifts which Nature has given with such splendid munificence, by ascertaining their mutual relations, and by arranging them as far as possible into a consistent and intelligible scheme. That is the primary aim; and it is the true inspiration of scientific work, as success in it is the appropriate reward. The material effects come later, if at all, and often by an indirect path.

When these views are well established in mind, we can look with great sympathy upon the feelings of those engaged in scientific pursuits when subject to the criticisms of those whose ideas and intellectual horizon are so curbed that they fail to see that human endeavour in the realms of science must, as in other walks of life, meet with disappointments as well as successes. We ought to sympathize rather than censure or criticize when earnest work ends in a *cul de sac*. The fact alone would be a discouragement were the worker not a true scientist, who knows that there is ofttimes failure before success is achieved. To the true scientist failure is but a stimulus to further effort; but this the critic in the outer world cannot appreciate. He expects sure, definite, and material results from all scientific work; but time and again there has to be disillusionment. Prof. Lamb admits that it may be that extravagant and impossible claims have sometimes been made on behalf of science; but never, he thinks, by the real leaders, who have always been modest in their claims, and guarded in their forecasts. In fact, the real leaders are the first to warn against, for instance, expecting too rapid results from research. We have frequently heard in the gas industry views expressed as to the slow harvest of achievement from research; but we are afraid that sometimes this inappreciation of what is being done is due to incapacity to detect the resulting gradual expansion of knowledge, and its installation in orderly position in the system of our industrial operations. The scientist sees and feels these things differently from those who are merely the observers and the expectant beneficiaries. Prof. Lamb sees them. He says: "It is true "that in the enthusiasm which attended the first sensa- "tional developments of modern industry, hopes were "conceived of a new era, where prosperity would ever "increase, poverty would be at least mitigated and re- "fined, national antipathies would be reconciled. When "these dreams did not swiftly come true, there was the "inevitable reaction, the idols were cast down, and "science in general has rather unreasonably come in for "its share of depreciation."

A broader view must be taken of these matters. Even exploration by the scientist must be regarded as more or less a speculation; but without it we cannot hope to progress with the certainty or at the pace that we are enabled to do by its aid. The results show us not only what we must do, but—sometimes through failures, which are not therefore unprofitable—they also direct us as to what not to do, and thus prevent waste. Regarding scientific work and research, our views should be of the broadest, sympathetic, and facilitating order; and we must always keep in the forefront of our minds that such work and research are necessary to our very existence.

Ash and Coke.

WELCOME is given to all research into the influence of the ash constituents of coal on coking processes; and in this connection considerable credit must be accorded to Dr. R. Lessing for his work, which contains a great deal of originality, if at the moment inconclusive in its teachings, although directive as to possibilities. The whole subject in truth is in an embryonic state; and we must leave it to the results of scientific investigation to guide us in the matter—especially as to the influence of ash composition on carbonizing practice and the resultant coke. In the paper which Dr. Lessing submitted at the recent meeting of the Society of Chemical Industry, and which we publish this week, he dealt with the influence of both the amount of ash in coke and the composition of ash. The practical importance of the former cannot be gainsaid; and the author has advanced from his own work and that of others—including Mr. C. B. Marson and Prof. Cobb in the Gas Fellowship Report to the Institution of Gas Engineers—sufficient testimony to show that additions of various inorganic compounds to pure coal do produce distinct changes in the yields, sulphur and nitrogen contents, appearance, and strength of coke. In fact, their active influence on the thermal decomposition of carbonaceous materials and on their combustion, or on the combustion of their solid coking residues, can (as Dr. Lessing says) no longer be doubted. But what has yet to be determined is which inorganic compounds have a beneficial, detrimental, or negligible effect on the technical and economic results of carbonization. As yet there is nothing definite available. Enlightenment has still to come. However, scientific investigation has carried us to a point in this respect when we are left wondering whether or not the time will arrive when, through their influence in directing the course of the primary thermal decomposition of the coal substance, we shall be deliberately adding in the carbonizing process selected beneficial inorganic compounds with the view of raising productive efficiency not only of the thermal but the qualitative order, particularly in respect of the structure of coke.

Meanwhile, on the subject of the influence of the amount of ash in coke, Dr. Lessing has added to the accumulated evidence information to assist the case for coke being as free as is practicable from avoidable ash, which today it is not. In this respect we have to get down to the proper preparation of coal; and in order to secure the maximum economy throughout the country and the industries, the preparation must take place at the collieries, for the subsequent economies far outweigh the cost of cleaning the coal and loss in bulk occasioned thereby. The losses start with transport and labour in handling, and are carried on to the waste occasioned in plant, labour, and product efficiencies in industries. Large figures are always more impressive than small ones; and the point as to loss is emphatically made by both substantial computation and general statement in the early part of Dr. Lessing's paper. To add weight to them, we reproduce his submissions here. The coking industry in 1924 carbonized 18,862,492 tons of coal. The ash content of the resulting coke (12,753,358 tons) may be taken as being between 8·5 and 12·5 p.ct., so that an average of 10 p.ct. of useless matter may be assumed. Thus the coking industry is burdened with a dead weight of 10 p.ct. of its output, or (say) 1,275,000 tons. This means capital outlay in ovens, conveying plant, and coke pushers, as well as an increase in operating expenses through having to handle and heat that quantity of inert material. Calculating on the basis of the number of coke ovens in use (12,081) in 1924, an equivalent of 1200 coke ovens is kept going to heat the valueless material to carbonizing temperatures. Though this ash is usually described as "inert," as a matter of fact it is active as being definitely

injurious. The whole of the arguments which in this relation refer to the coking industry can be applied to the gas industry, and perhaps with more force, since (as Dr. Lessing observes) the average ash percentage of gas coals is higher, and, through distances, the carriage from pithead to gas-works is heavier than in the case of the coke-ovens. The losses occasioned by all this useless matter in both gas and metallurgical cokes are distributed among the users; and the injury thus occasioned to industries and (in the case of household coke) to domestic consumers is incalculable. To a large extent, the presence of that useless matter may be charged with subscribing largely to the disinclination of people to use a solid smokeless fuel.

The arguments for an organized attempt being made to compel the cleansing of coal at the pithead gather in force daily; but there is a singular apathy regarding the matter which can only be described as mysterious.

Electricity as a Cause of Fires.

THE Institution of Electrical Engineers have a volume of rules to guide in the installation of electricity with the object of doing what they can to ensure safety. The Fire Insurance Offices have subscribed to, and adopted, those rules. But there is no one to enforce them, unless the Fire Insurance Offices refuse to insure property which is wired in manner that transgresses the rules. Had no reason for them existed, the rules would never have been deemed necessary by the representative Committees who have been responsible for their drafting or revision as experience dictated. But there are men in the electricity industry who have heartily denounced the rules as standing in the path of electrical progress—apparently believing in freedom respecting the character of installation work for advancing the interests of the industry rather than in the stronger reputation that must arise in relation to safety from taking every precaution possible to prevent mishap. The Electrical Contractors' Association, on the other hand, who ought to know about these matters, have started a registration scheme for contractors, and no one is admitted to the register unless there is assurance that the individual or firm carries out work that, so far as human ingenuity can provide, is unimpeachable. The London County Council have special regulations regarding the installation of electricity in places of amusement—such as theatres, music halls, and cinemas; the Home Office have expert inspectors of electrical equipment in factories and workshops, and year after year there come reports of contravention of the regulations! Why all this attempt by organizations and central authorities to protect the public if there is no occasion for it? Judging from the declamations of our electrical contemporaries whenever a fire is attributed to electrical causes, and the ascribing of such statements to the mental deficiency of the reporters, either those who have tried to promote protection through regulations and registration are fools, or the journalists who habitually protest against any indictment of electricity as a cause of fire deserve the description. The fact is that there are shoddy and defective installations. The contractors know it; the factory inspectors bear witness to it; and what is more, every electrical engineer is aware of it. Yet this is allowed to go on, because of the fear that public knowledge of these things will add to the other difficulties of electricity in making the progress that is desired.

Our interest in this matter is revived by some correspondence which has appeared in the "Manchester Guardian." Mr. A. R. Corlett is the Chief Officer of the Manchester Fire Brigade, and he has been having a talk with the members of the Manchester Rotary Club. In the course of this, he said:

> A fruitful source of fires is electricity. The main switch of an installation should be cut-off when the premises are closed at night. The origin of many fires may be traced to faulty alterations made by some "handyman" to what was formerly an efficient installation. In many cases of fires irons have been left to rest on wood with the current still on. Many fires have been found also to have started in places where electric wires have crossed gas-pipes. Competent workmen should be employed in alterations, and gas jets and rings should never be on wooden bases.

We agree with Mr. Corlett in all this—even to the suggestions as to gas jets and rings. But he has been attacked unmercifully for his statement—not that we think he will mind this, as he speaks from experience; and a man who has the capacity for being the chief of the Manchester Fire Brigade is not likely to be thin-skinned, or to be deterred from uttering a warning note when occasion requires and opportunity arises. What he said should be of benefit to the electricity industry, and not to its injury. The criticism that has been made of his statement is too silly for specific reference. A careful reader will see that incompetent workmanship and the neglect of precautions are at the very base of what he had to say. But we turn from Manchester to Glasgow. In his annual report, the Chief Officer of the Fire Brigade of that city gives the numbers of fires caused by electricity and gas during the year ending May 31 last. The total for electricity is 65; for gas, 24. The figures are worth setting out in tabulated form:

	Electricity.	Gas.
Dwelling-houses and attic	27	16
Outhouses, sheds, and cellars	2	1
Roofs, passages, and staircases	1	—
Shops (various)	17	3
Churches, halls, and institutions	4	—
Works, workshops, and yards	6	3
Hotels, restaurants, and tearooms	2	1
Motor garages	1	—
Stores and warehouses	4	—
Tramcar	1	—
	65	24

When we consider the large connection of gas throughout Glasgow, and the diversity of its applications, in comparison with electricity, the figures become still more interesting. It was not long ago that an official of the Glasgow Electricity Department was bemoaning the low percentage of wired houses in the city compared with the high percentage of gas-piped houses. And the use of electric radiators and cookers is numerically of a pigmy order contrasted with gas fires and cookers. The testimony accumulates from practical experience that safety is a stronger attribute of gas than of electricity.

Training Gas Engineers in Scotland.

We congratulate the North British Association of Gas Managers upon the practical work they have done, and have done well, in connection with advancing in Scotland the Education Scheme of the Institution of Gas Engineers. They have a Committee of Advice, who have been able to be of assistance to many students in advising courses of study, and in other ways. We strongly counsel the juniors in the gas engineering profession to take full advantage of the experience and knowledge of the Committee. There is nothing that can be of greater help to the future of the industry than for its present chief officers to do all they can to advance the standard of education and training for their successors. It is good work. Courses of study have been arranged at the Royal Technical College, Glasgow; and the coming session will see courses become operative at the Heriot-Watt College, Edinburgh. Last session the number of students was very gratifying; and Scotland has already one student who has gained the Institution Diploma—Mr. Duncan Melvin. Under consideration is the question of financially assisting the colleges; and proposals in this regard will shortly be placed before the members of the Association.

Reassurance as to Oil.

The gas industry is naturally interested in the question of the future of oil supply and demand, both as a producer through the carbonization of coal, and as a user for enrichment purposes. And besides, the business in benzole to-day is not an unimportant one for all coal carbonizers. A 300-page report has lately been issued by a Committee of eleven of the Directors of the American Petroleum Institute; and it has been presented to the Federal Oil Conservation Board. The conclusions are reproduced in another part of this issue of the "JOURNAL;" and it will be seen that the chief of them is that there is no imminent danger of the exhaustion of the petroleum reserves of the United States. A few years ago it was officially calculated that,

at the then rate of progress of consumption and export, the natural petroleum supplies would have a life of about thirty years. The present investigators do not seem to have made any computation as to longevity. They have preferred to be general and somewhat vague.

Export Coal Values.

Last week information was given as to the coal exports during July and for the seven months of the year; and it was pointed out that the average value per ton of gas coal shipped in July was 18s. 5d. This figure is 4s. per ton lower than the value of the exported gas coal in July, 1924. The 4s. on the quantity shipped in July this year—561,225 tons—represents £112,245; and to this has to be added the fact that the exports of gas coal were less by 224,373 tons in July than in the corresponding month of 1924.

Mines Employment and Output.

From the "Board of Trade Journal," we learn that during the three months ending with June the depression in the coal industry deepened sensibly, and the output was lower than in any quarter since 1921. The number of wage-earners employed was reduced by 40,000 when compared with the first quarter, while, as compared with a year ago, the reduction amounted to 96,000, and fewer men were employed than at the outbreak of war. The quantity of coal available for consumption at home was 10 p.ct. less than in the second quarter of 1924, in spite of additions made to stocks. The quantity of saleable coal raised was only slightly more than 58 million tons, and was 8 million tons less than in the previous quarter and $7\frac{3}{4}$ million tons less than in the corresponding period of 1924. The number of wage-earners on June 27 was 1,058,600, as compared with 1,122,700 on March 28. Including clerks and salaried persons, the average number of persons employed in and about the mines during the quarter was 1,114,000, or 3000 less than at the outbreak of the war. The quantity of coal available for consumption in Great Britain during the quarter was approximately 40 million tons, or over $4\frac{1}{2}$ million tons less than in the corresponding period of 1924, and over 8 million tons less than in the second quarter of 1913.

FORTHCOMING ENGAGEMENTS.

[*Secretaries of Gas and Kindred Organizations are asked to assist in making this diary of events as complete and useful as possible by sending the earliest intimation of all meetings.*]

Sept. 3-4.—NORTH BRITISH ASSOCIATION OF GAS MANAGERS.—Annual general meeting at Dunfermline.
Sept. 8.—NATIONAL GAS COUNCIL.—Meeting of Central Executive Board.
Sept. 9, 10, 11.—IRON AND STEEL INSTITUTE.—Autumn meeting in the University, Edmund Street, Birmingham.
Sept. 14-16.—INSTITUTION OF PUBLIC LIGHTING ENGINEERS.—Second annual meeting and conference at Leeds.
Sept. 15-17.—IRISH ASSOCIATION OF GAS MANAGERS.—Annual meeting in Belfast.
Sept. 23.—EASTERN COUNTIES GAS MANAGERS' ASSOCIATION.—Autumn meeting at Stamford.
Oct. 19-21.—BRITISH COMMERCIAL GAS ASSOCIATION.—Annual conference and general meeting in Plymouth.

INSTITUTION OF GAS ENGINEERS.

Sept. 7.—2.30 p.m., Emergency Committee. 3.30 p.m., Finance Committee.
Sept. 8.—4.0 p.m., Advisory Committee on Education.
Oct. 12.—2.30 p.m., Refractories Research Joint Committee.
Oct. 13.—4.0 p.m., Consultative Committee of the Education Scheme, followed by meeting of the Advisory Committee.
Oct. 22 (provisional).—2.30 p.m., Emergency Committee. 3.15 p.m., Finance Committee. 3.45 p.m., Council Meeting.
Nov. 10.—4 p.m., Advisory Committee on Education.
Nov. 11.—11.30 a.m., Emergency Committee. 12.15 p.m., Benevolent Fund Committee of Management. 12.45 p.m., Finance Committee.
Nov. 25.—11 a.m., Institution's session at the Public Works, Roads, and Transport Congress.
Dec. 2.—Official visit to the Shipping Engineering and Machinery Exhibition at Olympia.
Dec. 8.—4 p.m., Advisory Committee on Education.
Dec. 9.—11.30 a.m., Emergency Committee. 12.30 p.m., Finance Committee.

PERSONAL.

Mr. R. J. MILBOURNE, J.P., has been elected a Director of the Elstree and Boreham Wood Gas Company.

Through a breakdown in health, Mr. W. W. FRIEND, of the Colonial Gas Association, has been compelled to relinquish his position of Manager of the Frankston Works.

Mr. and Mrs. HENRY FOSS, of Thirsk, have received many congratulations and gifts on the occasion of their Golden Wedding. Mr. Foss, who is a native of Worcestershire, and is 73 years of age, is Manager of the Thirsk Gas-Works, and is very popular in the district. It is 49 years since he went to Helmsley, to be Manager of the gas-works there, and ten years later he was appointed to Thirsk. The Directors of the Company have shown their appreciation of his faithful services by presenting a luxurious armchair to each of the happy couple, who still enjoy excellent health.

OBITUARY.

It is with regret that we record the death of Mr. H. A. UNDERWOOD, a Director of the Colonial Gas Association, Ltd., which occurred recently in London. For many years Mr. Underwood had been Chairman of Directors of the Williamstown Gas Company, Ltd., and on the amalgamation of that Company with the Colonial Gas Association he was invited to take a seat on the Board.

The death has occurred, at the early age of 41, of Mr. HARRY BLAKEY, latterly of Guernsey. Mr. Blakey, who was a native of Barrowford, near Nelson, secured his first managerial post at Morecambe, where he was Gas and Water Engineer for the borough. Subsequently he held engineerships under the Councils of Shipley, Spalding, and Hindley.

The death is announced at Moseley, Birmingham, of Mr. HUBERT BEWLAY, M.Inst.C.E., aged 82, an ex-Alderman of Birmingham and a Director of Messrs. Thomas Piggott & Co., Engineers, of Birmingham. He was an articled pupil with the firm, and his active connection with it extended over a period of sixty years, remaining up to the time of his death. A few years ago a presentation was made to him in recognition of his long association with the Company, and as a token of esteem of the staff and workpeople.

ELECTRICITY SUPPLY MEMORANDA.

THE "Electrical Review" has presented its readers with a little homily which, we hope, will be read and taken to heart by all electrical men and by certain electrical journalists. The text is "Exaggeration." It is a subject upon which something can always be profitably said in electrical regions. Never in our whole experience have we met with so much exaggeration from any source as has emanated from those quarters. It is generally in respect of electrical performance and the inferiorities of gas. But a singular thing is that, though this takes place frequently, and though there is adherence by word to the hyperbole, the electrical champions refuse to come out into the open, and have public and practical demonstration to show that, for comparable quantitative work, their professions can (or cannot) be established. This fact has in itself great demonstrative value. Another thing is that they often ridicule (though they will not advance rebutting evidence to prove inaccuracy) theoretical calculations, even though those calculations go to show that it is physically impossible to get out of a quart measure more than it will hold, any more than it is possible to get from a KW.-H. any more than its potential heat energy. However, the "Electrical Review" says "overstatement is a weapon often employed by propagandists." We are sorry our benevolent old friend has had this experience; but casting our eyes over electrical history we know how true is the confession. Our contemporary falls into philosophic mood. It says: "'Stunts' on occasion justify themselves in the result; but the public tire of stunts, and once bitten become twice shy," as well as "critical and sceptical." But strange that these things should be in the electrical world. How exaggeration has grown up in it is a perfect mystery, if it be true that "electricity is able to do so much, and to do it all so well, that exaggeration is quite unnecessary." And the surprise becomes heaped-up and almost overwhelming when we find that "the merits of electrical service—when it is given proper trial—are self demonstrative." Our contemporary, knowing how much we admire and approve its good intentions, will forgive us quoting *in extenso* the following:

On Exaggeration.

> Some criticism may be offered of those who have advocated it [electricity] as a panacea for all industrial ills at a time when hundreds and thousands of men have been earnestly searching for a way out of most serious situations. Its advocacy as the householder's way of solving domestic problems requires

discretion too, because, say what we will, in large numbers of homes there is not money to spare for electrical installation and supply at present costs. Convenience is worth much to many, but it cannot be paid for by all. Even with the "all-in" rate of the electric house, the bill is not small compared to previous bills for lighting and heating—it is in convenience and cleanliness and labour-saving that electricity scores; and these are things which must be paid for. The consumer who is led on to the mains under false impressions as to cost is not going to be a help in the long-run—he may even be a hindrance if he spreads abroad an anti-electrical experience.

Regarding electricity, we agree that "publicity must be employed forcefully, but fairly stating its merits." This should apply to all commodities.

Water Heating.

Perhaps the writer of "Cooking and Heating Notes" in the "Electrical Times" will pay a little heed to the words (commented upon in the preceding paragraph) of the editorial writer in the "Electrical Review," because we have occasionally found him guilty of exaggeration. He has been writing on the subject of hot water supply as a profitable business. It is undoubtedly a profitable business for electricity suppliers if their customers can put up with it. He says that "water heating electrically has always been a bit of a bogey." We agree, but he might have intensified the "bit" without exaggeration. He accuses contractors in particular with regarding this application of electricity with disfavour; and then he immediately drops into exaggeration. We find it when he says that actually "where electricity is available at 1d. per unit (1½d. per unit or more is an economic price in many cases), electric water heating is a practical proposition, competitive in cost with alternative methods. This statement is equally true of heating by electric hot water radiators." We invite the writer of the statement to depart from generalities, if it will not be too great a wrench, and give actual data in comparison with gas and coke heating for equal service. These he does not supply in his article. Instead he says (which is the way of such electrical men): "Possibly it would be contended that calculations based on heating values and other cognate factors indicate that electricity must be much more expensive than alternative methods. It is such arguments that the gas interests are always putting forward." Surely such arguments are better than vaporous writing such as we have under notice. But we are quite prepared to go into actual costs with our friend if he will only ascend to precise figures for gas and coke heating of water as compared with electricity, not omitting the time factor, quantity in relation to time, and thus the frequency of serviceable supply. There are such a lot of pregnable points in these connections with electric water heating that we should like our friend to present the data on which he bases his belief that electric water heating is "competitive in cost with alternative methods," in order that we may fully discuss the matter with him. However, he tells us that the "difference between practice and theory lies in the inherent characteristics of electricity, the ease with which it may be applied anywhere, the absence of all exterior equipment—such as flues, vents, chimneys, and so forth, and the elimination of the need for frequent attention." The electrical contractor who studies the practical side of the matter "will discover a hitherto unexplored Tom Tiddler's ground from which he has been kept by the bogey of dear B.Th.U., which competitors in the water-heating business have never failed to present as a far more fearsome spectre than it is actually." Very well, then let us have the actual data, and not mere words. The unwise writer proceeds to quote a case where for a central heating plant a chimney cost £700; and he points out that this and other expenditure would not be incurred with electricity. There are few central heating plants which require chimneys costing £700. But the critic has manifestly yet to learn that an initial capital expenditure, *plus* maintenance cost, may save a tremendous sum in operating expenses; and a central heating installation which needs a £700 chimney is not one with which electricity could cope at 1d. or 1½d. per 3412 B.Th.U., at *x* efficiency. It is sheer foolery to speak of electricity in connection with an installation of that kind.

Safety.

During the past few weeks, note has not been made of all the evidence that continues to oppose itself to the righteous indignation of our electrical friends over the charges of unsafety and unreliability which are at times levelled at it. Of course, one must feel some sympathy for those who have to defend (notwithstanding a very definite trace of exaggeration, against which the "Electrical Review" declaims) their own particular interest, but at the same time one cannot be blind to facts. For example, Harry Light, while repairing the roof of a house at Sebastopol, Monmouth, recently came in contact with a live wire. He has ceased his activities on earth. Also lately a serious explosion occurred at the power station of the Clyde Navigation Trust, Govan Graving Dock, Glasgow. One man died through injuries, another sustained a lacerated forehead, and considerable damage was done to the building. On the 1st ult., a report was published of a fire which occurred at the switchboard of the Hammersmith Borough Council's electricity station, and which disorganized the supply to the district for two hours—light and power being cut off. Four of the employees were overcome by fumes, and were treated at the West London Hospital. Fires on the premises of electricians are of fairly frequent occurrence. Just lately one was reported on premises in St. Thomas Street, Bermondsey, occupied by a firm of electrical engineers, and another on the premises of Messrs. Heaney & Sons, electricians, of Market Place, Henley-on-Thames. On Aug. 20, the newspapers recorded a breakdown of the electric current on the train service between Broad Street and Richmond. The reliability and safety of electricity are beyond reproach—according to the electrical papers.

Hydro-Electric Power.

Although in this country we have no important direct concern in water-power electricity schemes, there is an incidental interest, as those who praise the electricity consumptions *per capita* of other countries carefully omit to state that those with consumptions higher than ours have water-power generation resources. This little omission must be excused in the fight for business expansion, and in seeking to obtain the sympathy of the Government and a dole of a magnitude measured by millions sterling from an electrically hypnotized Government. Comparisons of *per capita* consumptions ought, of course, only to be made with countries which use solid fuel, and perhaps a little oil, exclusively for generating purposes. But we suppose it will always be difficult to get everybody in the world to subordinate their personal interests to the truth. However, excepting perhaps in countries with especially luxuriant resources, it is not all plain sailing with water power. We have heard before of various countries—Switzerland among the number—where the communities have been put to great and prolonged inconvenience by droughts curtailing the available supply of electricity, and thereby causing the wrecking of all the customary applications of the energy. Now we see that the "Electrical World" reports that the continuing drought in the Mountain States, and especially in Colorado, has curtailed the production of energy at a number of municipally owned hydro-electric plants—notably Longmont and Loveland—and stand-by service has been required on several occasions. The result of this sort of thing is that greater consideration is being paid in those countries to the provision of stand-by steam plants; and the stand-by plants will not improve the charges on the general supply. But when one is dependent on the unreliable elements for the maintenance of the conditions necessary for production, it is well to have a second string to one's bow. Without warning, the elements will go on strike; and there is no opportunity, as with labour, for entering into negotiations with them as to the conditions on which they will resume their activities.

Gas Used in Ink Making.—The problem of making ink as the Ancients made it—of unrivalled permanency, stability, colour, and non-corrosiveness—is, says the "American Gas Journal," believed to have been solved by the use of town gas. Years ago inks were made from plant juices which darkened, instead of fading, on exposure. To-day, through the use of the gas-fired cauldron, we have the extract and strength of the blue Aleppo nut galls, which are stated to be used exclusively by one of the oldest ink-making firms in the country. This firm, incidentally, have doubled the output of their plant, besides realizing increased economy, ease of control, and better quality of product, since the introduction of town gas into this field. The extract of the nut galls is boiled at about 165° for two hours.

Irish Association of Gas Managers.—This year the business meeting of the Association will extend over two days, and will take place in the Ulster Hall, Bedford Street, Belfast, on Tuesday, Sept. 15, and Wednesday, Sept. 16; and on the Thursday there is to be an excursion to Portrush and the Giant's Causeway. At the opening session on Tuesday morning (after a welcome by the Lord Mayor, Alderman Sir W. G. Turner, J.P.) Mr. J. D. Smith, M.Inst.C.E., J.P., will deliver his Presidential Address, and Mr. Walter Hole will deal with the subject of "Technical Training within the Gas Industry." In the afternoon, Dr. E. W. Smith will address the meeting on "Gas Charges and Industrial Gas;" and a paper on "Water Softening" will be contributed by Captain E. Brooke Pike, F.C.S., of United Water Softeners, Ltd. In the evening members and their lady friends will be the guests at dinner, in Thompson's Restaurant, of the Chairman and members of the Belfast Corporation Gas Committee. The first business on Wednesday morning is to be the annual general meeting of the National Gas Council, presided over by Mr. W. J. Grey, A.C.A., of Dublin, to be followed by a statement by Mr. W. M. Mason on the Work and Policy of the British Commercial Gas Association. The session is also to include two papers—one by Mr. A. Forshaw, M.Sc., on "Domestic Use of Coal Gas," and the other by Mr. T. J. Reid, of Ballina, on "Irish Gas-Works Problems." The afternoon is to be devoted to an official visit to the Belfast Gas-Works and the Gas Exhibition, and the evening to a lecture by Dr. E. W. Smith on "Town Gas for Industrial Purposes." Members of the National Gas Council and of the "B.C.G.A." are cordially invited to attend the meetings.

TAR TREATMENT IN THE SMALLER GAS-WORKS.

We have just received an interesting communication from Mr. J. Gaunt, the Engineer and Manager to the Aberystwyth Gas Company, in which he tells us that during the season extending from February last till August he has treated some 32,000 gallons of crude tar in his 100 gallon per hour capacity "T.I.C." (lead bath) tar treatment plant, has produced satisfactory road-surfacing materials, and has been able to increase his receipts from residuals by some £500.

As we understand the capital cost of the installation was about £450, it would appear that his plant has proved a highly profitable investment. It is evident, therefore, that if a suitable plant is installed, the treatment of tar on works the size of Aberystwyth is not only a profitable undertaking, helping to reduce the cost of production of gas, but is a home and local source of supply of road-surfacing materials, which, from a national standpoint, should be given every encouragement by the Ministry of Transport.

BLACKS AND PITCHES.*

Reviewed by Dr. W. B. DAVIDSON.

This is the second volume of the series of oil and colour chemistry monographs, edited by Dr. R. S. Morrell, and published by Ernest Benn, Ltd. There are promised six more volumes of this series, dealing with drying oils, pigments and paints, paint and varnish films, volatile solvents, analysis of pigments, paints and varnishes, and resins.

In the volume, entitled "Blacks and Pitches," extending to 174 pages, there are 21 chapters dealing with such subjects as graphite, carbon black, lamp black, black pigments, rubber pigments, chemistry of bitumens and pitches, and methods of testing same, native asphalts, asphaltites, petroleum asphalts, coal-tar pitch, miscellaneous pitches, fatty acid pitches, weathering and ageing, fabrics, paints, and paving materials. Thus a large amount of ground is covered. Useful information is given on a great variety of materials, their qualities, uses, and tests.

As a monograph, one might have expected a comprehensive account of blacks and pitches, in considerable detail, condensed but explicit. In the book under review, it is therefore rather disappointing to be referred so often to other (rather expensive) works, and original papers. Most scientific men in these days of high output of scientific literature have not the time to wade through the published details of new researches on work which may be to them only of secondary importance; and one feels indebted to the well-read expert in the branch in question who will go to the trouble of providing a sound summary or digest of such new work.

The key to the numbered references appearing in the text is supplied at the end of each chapter, together with the bibliography on the subject. The utility of references and bibliography will no doubt be greatly appreciated, though it would be better were the author more authoritative. He is at great pains to give everyone concerned credit for work done; and while this must be considered a good fault, the tendency is for the references to become unwieldy in number. In the present instance they run to 223.

Turning with special interest to the chapter on testing bituminous materials and pitches, one is disappointed to find great paucity of detail and a lack of completeness, as well as of authoritativeness. Of the 44 tests mentioned, only two or three are capable of being carried out by aid of the meagre description given. There is plenty of space in the book for setting-out those tests—in other words, less important matter occupies a great deal of room. For example, the pages on the nature of coal seem superfluous.

The book contains 20 illustrations, four of which are of the Hird continuous coal-tar distillation plant; but the subject-matter relating to coal tar and coal-tar pitch is disappointing both in quantity and in quality.

Another deficiency in the book is information regarding the qualities essential in insulating compounds so largely used in the electrical industry, the methods of testing for dielectric strength, vulcanized bitumen for electric cables, &c. We also hoped to find some comparison of the relative values of bitumen and coal-tar pitch for road making, but have been disappointed.

It must be confessed, however, that a great deal is to be learnt by perusal of the book; and one realizes that it is a hard task to write a really satisfactory monograph on blacks and pitches.

* "Blacks and Pitches," by H. M. Langton. Ernest Benn, Ltd., 1925.

Discussions on Institution Reports and Papers.—Members who may have written contributions to make to the discussion of any of the reports and papers which were presented at the recent meeting of the Institution of Gas Engineers are asked to send them as soon as possible to the Secretary, Mr. Walter T. Dunn, No. 28, Grosvenor Gardens, Westminster, S.W. 1.

MANCHESTER AND DISTRICT JUNIOR GAS ASSOCIATION.

Visit to the Humber Works of Messrs. G. & T. Earle, Ltd.

About forty members of the Association, under the Presidency of Mr. J. T. Haynes, A.M.Inst.C.E., of the Bolton Gas-Works, spent an interesting and instructive day on Aug. 26 in visiting the Humber Works of Messrs. G. & T. Earle, Ltd. The visitors were accompanied by Mr. J. H. Pentith and Mr. C. R. Cherry, on behalf of Messrs. Earle; the journey being made by special saloon.

On arrival at the works the visitors were welcomed by Mr. F. Gibson and Mr. F. W. Davis, Directors of the Company. After lunch, they were taken to the chalk quarry, about a mile from the works, to inspect a large digger at work, quarrying the chalk and loading it into wagons. This digger deals with about 80 tons per hour. The limestone is conveyed in trucks from the quarries to the crusher, in which it is broken down to pass through a 4-in. aperture, whence it passes into a mill with revolving hammers, reducing the stone to pass through a 1-in aperture. After being conveyed to special silos, the limestone is then ground in revolving tube mills, and mixed with water to a consistency suitable for it to be pumped through a tube down to the cement works.

After the chalk quarry had been inspected, the visitors were conveyed to the cement works, where, under the charge of Messrs. Earle's technical staff, they were shown the whole of the processes employed in the manufacture of cement.

Since Messrs. Earle's have taken over the Humber Works, the land-sealed "Pelican" brand of Earle's cement has been manufactured here, as well as at their Wilmington Works, and the demand for this well-known brand is so great that a new kiln has recently been installed in the Humber Works, together with additional grinding plant.

One of the most interesting features of the visit was the packing of the cement into bags, which is done by machinery; one machine, with two nozzles, being capable of packing 23 tons of cement per hour. These sacks are tied at the mouth before being filled, and there is a hole in one of the bottom corners of the sack through which the cement is injected from one of the nozzles of the machine; the hole being automatically sealed by means of a flap in the sack when the weight of the cement presses on to it.

After the inspection of the works, tea was served.

Mr. HAYNES expressed his appreciation of the interesting day that they had had, and also his regret that Mr. T. R. Pentith, the firm's representative in the Manchester area for many years, had been so seriously ill. He wished him a speedy recovery.

Mr. A. L. HOLTON, Works Manager of the Bradford Road Gas-Works, Manchester, proposed a vote of thanks to Messrs. Earle, coupling with it Mr. G. F. Earle, Mr. F. Gibson, and Mr. F. W. Davis, Directors, and Mr. J. D. Sky and Mr. W. J. Cook, Works Managers of the Humber Works. A thousand-and-one uses were made of gas, and undoubtedly there were as many uses for cement. Every gas engineer knew that he wanted the highest quality of material for his work; and undoubtedly the product of Messrs. Earle had attained a high standard. He noticed that the firm had been established in 1809, and that at the present time they turned out about 8000 tons of cement per week.

Mr. G. BRIGGS, Assistant Engineer and Manager of the Hyde Gas Company, seconded the resolution. The machinery which they had seen in the works was, he felt sure, the most up-to-date that could be used for the manufacture of cement. The use of pulverized fuel in the kilns was something new to many of them, but was one of those things which in the future they would have to consider more fully.

The PRESIDENT remarked that Messrs. Earle had been instrumental in setting a standard in the production of cement which was recognized throughout the world. He pointed out, however, that it was of little use for the firm to attain such a standard if the cement was not properly used; and it was up to them as engineers to see that their concrete was well mixed and judiciously applied.

Mr. GIBSON, in reply, apologized for the absence of the Managing Director of the Company, Mr. G. F. Earle. He said that a good deal of his personal pleasure had been derived from the fact that the firm had given pleasure to their visitors. They were grateful for the expression of sympathy with reference to their representative, Mr. T. R. Pentith, which would be conveyed to him at an early opportunity. Reference had been made to the quality of the cement now being manufactured by them; and he claimed that they were fully entitled to be paid for its quality.

Gas for Drying Bathing Suits.—In Olympic Park, Irvington (N.J.), is to be found one of the largest swimming pools in the world. It covers an area of 80,000 sq. ft., and permits the bathing at one time of 8000 persons. In connection with an enterprise of such magnitude, the drying of bathing suits and towels becomes a big problem; and at Irvington gas is, state the Pennsylvania Public Service Information Committee, extensively employed for this purpose. A dryer, having a capacity of 300 suits, is used, and hot dry air is supplied by a gas-fired heater. This heater furnishes 50,000 c.ft. of air every hour at 300° Fahr. when operated at full capacity. Working at 40 p.ct. capacity, 2000 suits are turned out every ten hours, with a gas consumption of 1 c.ft. a suit.

INFLUENCE OF ASH CONSTITUENTS ON THE COKING PROCESS.

By R. LESSING.

[A Paper read at the Annual Meeting of the Society of Chemical Industry, at Leeds, on July 15.]

The ever-increasing importance of the fuel problem has caused a speeding-up of researches into the constitution, properties, and utilization of coal, and the spasmodic investigations formerly carried out by a few individuals have given way to intensified investigations by a great number of workers, many of whom now enjoy the advantage of closer co-operation among themselves, and of the co-ordination afforded by research schemes of Government Departments or large industrial combinations. The output of scientific results on questions of the constitution of coal has been greater during the last decade than in the century preceding it. With the accumulation of new facts, the recognition of the insufficiency of our knowledge of coal is growing; and thus the need for further unravelling the properties of this most valuable raw material and its behaviour under the conditions of its technical application is emphasized.

Until recently the mineral components of the coal conglomerate were regarded as undesirable, but unavoidable, inert matter, and fuel technologists contented themselves in the examination of coal with a determination of the total ash content. Work on the composition of the ash-forming compounds and their distribution in coal[1] has convinced me that the study of these inorganic constituents must be pursued much more intensely, if a high efficiency of fuel utilization is to be attained.

In a lecture delivered before the Birmingham Section of this Society[2] a few months ago, I endeavoured to give a broad outline of the problems with which we are faced in this hitherto neglected branch of coal research, and to show the extent and limitations of our knowledge of the composition, distribution, manner of combination, and behaviour at elevated temperatures of those compounds which, upon incineration of coal, appear as ash.

To the carbonizing industries the question of coal ash is probably of more direct and more urgent concern than to any other class of coal consumer. This applies more particularly to the coking industry, while it is almost as important, if not equally pressing, to gas manufacture, as it will be eventually to low-temperature carbonization.

The influence of ash constituents on the coking process may be considered under two main headings:

(1) The influence of the amount of ash.
(2) The influence of ash composition.

(1) INFLUENCE OF THE AMOUNT OF ASH.

In the absence of reliable statistics showing the chemical composition of the coal carbonized in coke ovens, which, with a reduced output, in 1924 amounted to 18,862,492 tons, or of the metallurgical coke made from it, amounting to 12,753,358 tons, the limits of the ash content of British metallurgical coke may be taken as lying between 8·5 and 12·5 p.ct., and an average of 10 p.ct. may be assumed.

Individual coke-oven works turn out a product containing no more than 7 p.ct. of ash, and restricted quantities of still lower ash content are made in isolated cases where particular attention is paid to coal cleaning. Against such exceptions must be put cases of the ash in coke rising to 15 p.ct., which were not infrequent during the immediate post-war period.

Ash as a Diluent.

The first and obvious function of the ash is that of a diluting impurity. If, for the moment, it is regarded as inert matter, we find that the carbonizing capacity of the industry is burdened with a dead weight of 10 p.ct. of its output, or (say) 1,275,000 tons. A corresponding capital outlay in ovens, conveying plant, and coke pushers has to be allowed for; and the operating expenses are increased by handling this quantity, heating it, and thus losing surplus gas and incurring railway charges and incidental expenses. It may be argued that on account of difference in specific gravity the oven capacity taken up by the ash portion of the coal is smaller than that for the corresponding weight of pure coal. Moreover, a considerable portion of ash is contributed by the fine dust of fusain and shale, which fills the interstices between particles without adding to the bulk volume. While this contention must be accepted, and may somewhat influence the quantitative relation, the general argument holds good.

Calculated on the basis of the number of coke ovens in use, which amounted to 12,081 in 1924, it would thus appear that the equivalent of 1200 coke ovens is kept going throughout the year for the benefit of heating "dirt" to coking temperatures.

As it will be shown later that the bulk of this ash is not inert, but definitely injurious, its bearing upon the thermal balance of the coking process and upon national fuel economy will be realized.

The same arguments apply to the gas industry, with its consumption of 18,104,400 tons of coal in 1924—and probably with greater force, since the average ash percentage of gas coals is higher, and the carriage from pithead to the carbonizing plant is heavier than in the case of coke ovens.

Ash of Coking and Non-Coking Coal Constituents.

It has been shown[3] that the coal constituents having the highest coking power—*i.e.*, clarain and vitrain (bright coal, anthraxylon)—are very low in ash. They do not usually contain more than 2 p.ct. of ash, and amount to from 70 to 80 p.ct. of the whole coal. The ash in the constituents devoid of coking propensities is not evenly distributed.

The non-coking constituents may be grouped under three heads:

1. Durain (dull coal, attritus) which contains from 6 to 7 p.ct. of ash, being white in colour and having the approximate composition of clay substance.

2. Dust which, without further grinding, passes almost completely through a 50-mesh screen. It represents the most friable portion of the coal, and consists of raw fusain, somewhat finely disintegrated clean coal, powdered shale, and calcite or ankerite.

3. "Dirt" comprising more or less carbonaceous shale or other rock, calcite or ankerite, and pyrites.

The mean figure of 10 p.ct. of ash in coke is equivalent to 6·75 p.ct. of ash in the coal carbonized. To this total of 6·75 p.ct. only from 1 to 1·5 p.ct. are contributed by the inherent ash of the coking fraction, while the balance of 5 p.ct. or more is derived from the "dirt" or non-coking coal fractions. It will therefore be seen that only from 1·5 to 2·5 p.ct. out of 10 p.ct. in coke are essential and unavoidable ash. It must further be remembered that a mean figure of 6·75 p.ct. of ash in coking coal is frequently exceeded, and that in such cases the proportion of avoidable ash is still further increased.

Effect of Ash as Inert Matter.

It will be shown later that certain ash constituents have an active influence upon the mechanism of carbonization. Leaving this point for the moment out of consideration, one may regard the bulk of the inorganic constituents as inert matter. Their function is then that of a diluent. They act similarly to the additions of sand, powdered coke, or electrode carbon, which have, for a long time, been used for judging the agglutinating power of coals. Up to a point their action is also analogous to that of coke breeze, the addition of which to coal to be carbonized has been recommended from time to time. The effect is not quite comparable with that of the use of blended mixtures of coking and non-coking coal. For, when such mixtures are submitted to the coking process, the non-coking coals take part in the general chemical and thermal reactions, and do not act merely mechanically as "bubble-bursters."

While the amount of ash in normal cases is not sufficient to keep discrete particles from adhering to each other, it reduces *pro tanto* the strength of the coke, and also causes the production of breeze. Coal breeze has invariably a higher ash percentage than the lumps from the same charge, and it is therefore to be expected that a reduction of the ash will have the effect of diminishing the proportion of breeze formed.

The fraction of coal which is particularly prone to form breeze is the dust containing fusain, &c. This is usually obtained in the coal-washing process in the form of a slurry. The practice of re-incorporating this material into the washed coking slack in order to gain bulk must be strongly deprecated.[4]

Disadvantages of Ash in Coke.

The drawbacks of a high ash percentage in coke are still more serious for the coke user. By way of example, it will suffice to consider the use of coke in the blast furnace. The same considerations will apply to other metallurgical operations, and with even greater force to some chemical processes such as lime burning.

E. C. Evans[5] summarized the deleterious influence of coke ash in a recent paper before the West of Scotland Iron and Steel Institute, as follows:

(1) It reduces the fixed carbon in the fuel.
(2) It necessitates the use of additional fuel and limestone for smelting.
(3) It reduces the hardness and resistance to abrasion in the coke produced (especially from weak coking coals), and thus increases the proportion of breeze.
(4) It reduces the available heat in the hearth.
(5) It reduces the reactivity of the coke, and, theoretically, would tend to increase the volume and reduce the temperature of its zone of combustion.

He refers to recent experiments at a British iron-works in which the coke normally used, and containing 12·5 p.ct. of ash, was replaced by a coke containing 8·5 p.ct. of ash. The furnace immediately began to drive faster, the output increased nearly 30 p.ct., while the coke consumption dropped from an average of nearly 24 cwt. to 19·4 cwt. In another series of experiments the quality of the iron was the predominant factor, and a higher hearth heat was required in order to keep the silicon percentage of the iron above 3 p.ct. The output was still 20 p.ct. higher than when using coke containing 12·5 p.ct. of ash, and the coke consumption dropped to 22·9 cwt.

The influence of the amount and composition of the ash in coke is of utmost importance for the limestone requirements of

a blast furnace. I have found in the rational analysis of a great number of coal ashes that the bulk of silica and the preponderating portion of the alumina in a coal ash are contributed by the "dirt" content.

This is clearly shown in Table I., in which the distributions of silica and alumina in an unwashed coking slack and a washed gas coal are compared:

TABLE I.

	Unwashed.	Washed.
	P.Ct.	P.Ct.
Ash in coal	18·01	4·92
Dirt "	20·00	5·0
Total SiO_2 in ash	50·25	34·14
Dirt " "	44·14	18·50
Total SiO_2 in coal	9·05	1·68
Dirt " "	7·95	0·91
Dirt SiO_2 : total SiO_2	87·84	54·18
Total Al_2O_3 in ash	24·54	24·32
Dirt " "	19·71	9·27
Total Al_2O_3 in coal	4·42	1·20
Dirt " "	3·55	0·46
Dirt Al_2O_3 : total Al_2O_3	80·32	38·11

It proves that by the washing process silica and alumina are reduced at a greater rate than the remainder of the ash. This would, of course, also apply to iron, with the obvious advantage of the incidental removal of inorganic sulphur.

If it should be possible to reduce or eliminate the bulk of the "dirt" from coking slack by more efficient coal-cleaning processes than are in vogue to-day, the limestone required for fluxing the silica and alumina from this source could be cut down very drastically, with a consequent saving of fuel for melting the slag, smaller losses of iron in the slag, and the incidental advantages of a burden richer in iron.

Read, Joseph, and Royster[6] have calculated from the data obtained from thirty blast furnaces that each additional pound of slag requires 0·45 lb. of additional fixed carbon, and pointed out the importance of keeping down the silica percentage in the iron ore. Obviously their argument holds good for the impurities in coke. From detailed analyses of coal ashes and average coke requirements of a blast furnace charge, I estimate that the silica and alumina in coke may be equal to 50 p.ct. or more of the amount of these compounds contained in the corresponding quantity of iron ore.

An estimate of the limestone required for fluxing the ash of a splint coal (analysis not stated) is given by E. H. Lewis,[7] who calculates the depreciation in value per ton of coal to be approximately 9·4d. for each 1 p.ct. of ash above a standard of 5 p.ct., based on present market values.

Considerable attention has of late years been focussed upon the quality of coke, but as yet there is no general agreement on the properties, particularly of a physical character, which coke should possess. There cannot, however, be any question but that freedom from avoidable ash is desirable for every purpose to which coke is put; and the preparation of coal in this respect will have to be improved considerably beyond the standard of present-day practice. The economies to be effected in blast furnace work will greatly outweigh the cost of cleaning the coal and the loss in bulk occasioned thereby.

(2) INFLUENCE OF ASH COMPOSITION.

The composition of the ash as far as it affects blast furnace work has already been dealt with, particularly from the economic point of view. The chemical composition of the inorganic constituents in coking coal is of no less importance in connection with the coking process itself.

One of the difficulties of studying the effect of inorganic constituents upon the coking process is the lack of knowledge of the chemical reactions which these compounds undergo, and, indeed, of the precise form in which the various elements are combined in the coal before coking. Silica may be free or in the form of pure clay (as in durain), shale of varying composition, or iron silicate. The iron, according to Sinnatt,[8] occurs in at least five forms. The differences found in the Al_2O_3 : SiO_2 ratio of the ashes of fusain, durain, clarain, and vitrain[3] prove alumina is not entirely present in the form of clay substance, or similar aluminium silicate. Whether and to what extent the alkalis and a portion of the lime are in organic combination is still a matter for conjecture. At high temperatures all these compounds are subject to the reducing action of the organic coal substance or its products of decomposition. Interaction between individual inorganic constituents is, in the first instance, dependent on their orientation to each other. Where contact is possible, polyphase equilibria are established, which again depend not only on temperature, but on the thermal reactions proceeding within the coal mass. Hence the examination of finished coke does not give a complete picture of the reactions taking place at high temperature.

An interesting example is the behaviour of pyrites at high temperature. Powell[9] found that pyrites in a variety of coals is completely decomposed between 300° and 600° C., according to the reaction $FeS_2 = FeS + S$. Further, some of the ferrous sulphide formed reacts directly with carbon to form organic sulphur—a result in agreement with those of Wibaut.[11]

When coke cools, even with limited access of air, oxidation of ferrous sulphide occurs, according to the equation $4FeS + 3O_2 = 2Fe_2O_3 + 4S$. When, on the other hand, coke is quenched quickly, this decomposition of ferrous sulphide is not complete, due to the rapid cooling below the effective temperature of about 500°.[10] The methods worked out by Powell for examining the various forms of sulphur in coal and coke are thus applicable to the study of the ash constituents. The difficulty of their examination is that treatment with acids and other reagents depends to a large extent on the size of particles. The mineral constituents being, in part, at any rate, firmly embedded in the carbonaceous mass, a preliminary disintegration of the coke—(say) in a colloid mill—should be used for the preparation of samples. Although analyses of the ash of coke cannot replace examination in the unoxidized state, some useful inferences may be drawn from them.

Table II. gives comparative analyses of the ashes from a coal and coke made from it in the laboratory at 900°. The sample was the clarain-vitrain fraction of a Yorkshire coking slack.

The interesting point is found that a considerable portion of the alumina was made insoluble in hydrochloric acid by the coking process. The iron in the ash shows no change before and after coking as regards its solubility in acid. The expected formation of iron silicate in the ash did not take place.

TABLE II.—*Yorkshire Coking Slack. Clarain-Vitrain Fraction.*

	In Coal.	In Coke.
Ash, p.ct. of coal	2·45	2·41
Analysis of	Ash from Coal P.Ct.	Ash from Coke. P.Ct.
Soluble in water	1·82	1·62
" HCl	42·54	35·98
Insoluble in HCl	55·64	62·40
Soluble in HCl (including soluble in water)—		
SiO_2	0·36	0·42
Al_2O_3	15·69	9·53
Fe_2O_3	22·99	22·83
CaO	0·90	1·52
MgO	0·30	0·27
Na_2O	1·29	0·98
SO_3	0·21	0·65
	41·74	36·20
Insoluble in HCl—		
SiO_2	42·16	43·14
Al_2O_3	10·76	18·16
Fe_2O_3	0·80	1·04
CaO	0·24	0·32
MgO	*Nil*	Trace
	53·96	62·66
Total ash—		
SiO_2	42·52	43·56
Al_2O_3	26·45	27·69
Fe_2O_3	23·79	23·87
CaO	1·14	1·84
MgO	0·30	0·27
Na_2O	1·29	0·98
SO_3	0·21	0·65
	95·70	98·86

At the same time this result does not permit of any definite conclusion as to the alternative formation of silicates and silicides in coke. Hempel[12] attributed the hardness of coke to the formation of carbon silicides, and Baehr[13] assumes the presence of iron silicide and iron carbide in coke. The further elucidation of some of these complex reactions is needed before the influence of the compounds formed on the properties of coke can be definitely assessed.

Catalytic Influence of the Mineral Constituents.

The mineral constituents of coal or their products in coke have been considered in the foregoing in their relation to the properties of coke. Their most important function lies probably in the influence they exert upon the course of thermal decomposition of coal. In 1914 I directed attention[14] to the catalytic effect of inorganic compounds on the carbonizing process. This effect was definitely established in subsequent work[15], and lately has been confirmed by others. A valuable contribution to the subject was recently made by Marson and Cobb,[16] who were able to show that additions of various inorganic compounds to pure coal produced distinct changes in the yields, sulphur and nitrogen content, appearance, and strength of coke. A considerable number of papers have appeared during the last few years dealing with the combustibility, reactivity, inflammability, and general structure of coke. Baehr,[17] in experiments on the reactivity of coke, found that iron acted as a promoter; increased reactivity was shown by impregnating coke with iron salts or by mixing blast furnace dust with the coke. In another series of experiments, iron was added to the coal before coking; and with an addition of from 4 to 6 p.ct. of iron the reactivity was double that of the coke made from untreated coal. The comparison of coke containing iron with the same after the extraction of some of this iron by means of hydrochloric acid gave results in the same direction. Similar results were

obtained by Koppers,[18] who, however, does not agree with Baehr's contention of the formation of iron silicide by reheating coke containing iron.

The influence of inorganic compounds on the thermal decomposition of carbonaceous materials and on their combustion, or on the combustion of their solid coking residues, can no longer be doubted. The problem before us now is to determine which compounds have a beneficial, detrimental, or negligible effect on the technical and economic results of carbonization.

For this purpose it seems desirable, or even necessary, to define the mechanism of the reaction more clearly. It is still questionable whether the functions of these compounds are truly catalytic or purely chemical. The small amounts which have been found sufficient to give distinctive results—*i.e.*, additions of the order of 1 p.ct. or less—seem to support the assumption of catalytic activity.

In work which is being carried out in my laboratory on behalf of the Fuel Research Board, I am endeavouring to furnish an answer to this question. From the results so far obtained no definite conclusion can be drawn, but the indications are that various additions affect the course of decomposition of the coal substance so as to bring about scission of the molecules at different points, with the result that the solid residue tends towards one or other modification of carbon.

In a previous paper[15] the results were recorded in order of coke yield. In the series at present in hand the cokes are analyzed for their ultimate composition, and interesting results are obtained by comparing the yield of carbon and hydrogen in coke with the total coal from which the coke was made.

In Table III. typical results out of a great number are recorded comparing the highest carbon yield with the yield from untreated coal, which usually gives not only the least coke, but also one of low carbon percentage.

The coal used was the clarain-vitrain fraction of a Yorkshire coking slack from Hoyland Colliery, containing 1·86 p.ct. of ash. It was prepared as described in previous work[15] with the exception that the coal was not extracted with hydrochloric acid before coking. The additions were made in molecular proportions as before described; the actual quantities amounting to 2·30 p.ct. of $Al_2(SO_4)_3$ and 1·62 p.ct. of $FeCl_3$ respectively.

TABLE III.

Carbonized at 600°.

Compound Added.	Coke.	Coke, *less* Compound Formed.	Carbon in Coke.	Hydrogen in Coke.	O + S + N in Coke.
$Al_2(SO_4)_3$.	75·48	74·79	64·60	2·45	6·17 p.ct. of coal
Untreated .	69·71	69·71	57·80	2·02	8·13 " " "

Carbonized at 900°.

Compound Added.	Coke.	Coke, *less* Compound Formed.	Carbon in Coke.	Hydrogen in Coke.	O + S + N in Coke.
$FeCl_3$ . .	65·38	64·68	58·82	0·81	3·14 p.ct. of coal
Untreated .	62·27	62·27	54·69	0·77	5·03 " " "

The ultimate analyses of the cokes themselves are recorded in the following table.

TABLE IV.—*Ultimate Analyses of Cokes.*

Compound Added.	Carbonized at 600°.		Carbonized at 900°.	
	$Al_2(SO_4)_3$.	Untreated.	$FeCl_3$.	Untreated.
C	85·60	83·03	89·96	87·82 p.ct. of coke
H	3·25	2·90	1·24	1·24 " " "
Ash	2·98	2·41	3·99	2·87 " " "
O + S + N .	8·17	11·66	4·81	8·07 " " "
	100·00	100·00	100·00	100·00 p.ct. of coke

The results, of which the figures in Tables III. and IV. are representative, demonstrate several new facts. They indicate that catalysts which increase the coke yield also tend to raise the percentage of carbon in the coke obtained. This becomes particularly noticeable when the carbon is expressed in terms of the original coal.

Such catalysts influence therefore the thermal decomposition of coal, so as to concentrate carbon in the solid residue.

A further somewhat surprising result is that considerable differences in the oxygen content of the cokes are shown. Sulphur and nitrogen figures are not yet available, but these elements can, together, only account for 2 or 2·5 p.ct. While they will also differ according to the addition of catalysts, as has been shown by Marson and Cobb, the larger differences must be placed to the account of oxygen. The oxygen figures will not be greatly modified by making allowance for the actual composition of the inorganic constituents of the coke, instead of deducting from the total the ash as obtained on incineration.

The explanation which suggests itself is that, according to the addition made, scission of the molecules may be directed to either carbon or oxygen linkages, or at any rate may bring about the detachment of oxygenated radicals of hydroxylic, carboxylic, or ketonic character to a greater or less degree. Thus, the balance of yields of solid residue and volatile products will be influenced, with a consequent change in the properties of both. The bearing of a varying residual oxygen content upon the inflammability, reactivity, and combustibility of coke has not been considered before, and is now the subject of investigation.

The fact that differences in the structure of coke, and the modification of carbon composing it, can be obtained by a suitable selection of added catalysts has been proved.

Carbon deposited on the coke surface by secondary decomposition of primary volatile products may alter the properties of coke to a certain extent. I pointed out before[14] that such secondary changes are subject to catalytic influence, and a great deal of work has since been done on this point, particularly in connection with cracking processes.

The opinion of some workers that the properties of coke depend mainly upon the extent of the change brought about by the secondary deposition of carbon fails to supply a complete explanation of the differences observed in various cokes. The present researches clearly show that the influence of ash constituents or added inorganic compounds is of a fundamental character in that they are capable of directing the course of the primary thermal decomposition of the coal substance.

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Gas Supply in Hawaii.

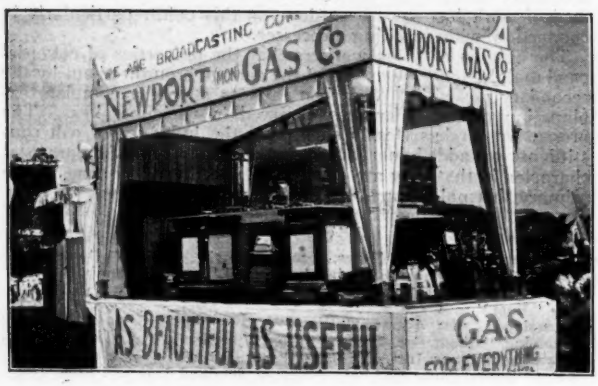
Unusual problems have to be solved in carrying on the business of gas supply in Hilo, Hawaii, where the white population is only about 500, in a city of 12,000 inhabitants, and of this 500 only a few remain more than a year or two. Orientals constitute the great bulk of the people. The Manager of the Hilo Gas Company (Mr. Wilson) has lately been relating his experiences; and what he has had to say has been reproduced in the pages of the "American Gas Journal." From this it appears that the Chinese are few in number in Hilo; but they are good customers, and give less trouble than any others, including the whites. A Chinaman's word is as good as his bond. He never defaults, and if unable to pay at the appointed time will always go to the gas office and say so, and advise when he can pay. The Japanese are the dominating race, so far as numbers are concerned; but the poorer classes use very primitive methods of cooking and heating, and the community kitchen is common—each family having its own charcoal pot, and cooking its meals in the general kitchen. The method adopted by the Gas Company of opening-up business relations with them is to get hold of a specially intelligent Japanese, and give him a hotplate free—charging only for the gas. When he has been using this for a short time in the communal kitchen, others inquire about them; and in several instances the Company have sold hotplates to all the tenants, as the result of their gift to the first one. The Japanese are great bathers; but their bathing facilities are as primitive as their cooking arrangements. In a number of communities, however, the Company have succeeded in getting gas used for heating bath water. These remarks, of course, apply only to the poorer classes. The well-to-do Japanese want everything modern and up-to-date in their homes, which are models of gas and electric efficiency. In fact, two-thirds of the gas used in Hilo is consumed by Japanese. One very commendable trait of the Japanese is that they always live within their means. The Filipinos are mostly of the poorer class, and, except when living in plantation houses where gas is furnished by the sugar company, cook their meals in the open over a couple of hot stones.

According to an Exchange telegram a new liquid fuel called "Carbonan" has been prepared by a Russian Engineer named Makhonin. The basis is coal tar; and it is reported that the fuel has been tested successfully by French naval authorities.

ADVERTISING GAS AT A CARNIVAL.

Successful Display of the Newport (Mon.) Gas Company.

The accompanying photograph shows a decorated lorry which was fitted up by Mr. T. A. Canning, Technical Assistant of the Newport Gas Company. All the appliances were in nickel-plated finish; and the colour scheme was carried out in heliotrope and white. The lorry proved a great attraction, and secured first prize in a carnival, held on Aug. 6, in aid of the Royal Gwent Hospital, Newport (Mon.). The Gas Company handed the prize money of £7 7s. to the Hospital Authorities.



Prize-Winning Lorry at Newport.

The firms who assisted in the display included Messrs. R. & A. Main, Ltd.; Radiation Ltd.; the Welsbach Light Company; Ewart & Sons, Ltd.; and William Sugg & Co., Ltd.

TECHNICAL PROBLEMS OF THE DAY.

By Dr. G. OFFE.

[From a Paper read at the Meeting of the German Gas Association Reprinted in "Das Gas- und Wasserfach" for Aug. 8]

The author dealt with investigations which have been carried out at the Cologne Gas-Works on four subjects of general interest.

BEHAVIOUR OF GAS IN STORAGE.

As a result of a remark in the course of a discussion at a recent meeting of the Association, the question had been investigated as to whether any dissociation takes place during storage of gas for any length of time in a holder. One of the Cologne holders was filled with 59,000 cub.m. [about 2,083,000 c.ft.], and left standing for five days, after which the gas, which had been specially made for the test, was passed out in the ordinary way. During the delivery, on two consecutive days, complete analyses were made every two hours, besides which CO_2, specific gravity, and calorific value tests were made every quarter-of-an-hour, and quantities determined hourly.

Results are tabulated of the complete analyses taken when the holder contents were 48,200, 32,200, 28,300, 20,000, and 16,500 cub.m., and they show uniformity throughout. The holder then had to be taken into ordinary use again, so that the last 16,500 cub.m. could not be tested; but the author is satisfied from the results obtained that the component gases remain uniformly mixed in storage, but the gas molecules are in constant diffusion and motion.

CORROSION IN MAINS.

The next question dealt with by Dr. Offe was that of the causes of corrosion in iron and lead pipes, which had recently been giving much trouble in Cologne. In one instance, a lead pipe which was damaged was found to be covered with a thick white crust. It was treated with boiling water, the liquid then being allowed to stand and crystallize-out. It was established by analysis that lead chloride separated out; and, when it was reported that the pipe had been situated about 1 metre below the points of a tramway rail system, the explanation was clear. The region of the points had been sprinkled with salt in winter time, and this had penetrated the earth in solution with rain water. As sodium chloride itself would have no action on lead, it must have been split into sodium and chlorine by the effect of the electric currents.

A much worse case was experienced in the neighbourhood of a tramway shunting station, where a Mannesmann tube was seriously damaged after only three months' use. In some parts, the asphalt and jute were eaten away, so that the serious condition of the pipe was revealed. In this case ferrous chloride was found—that is to say, the protoxide form. Under the influence of the chlorine, the oxide form might have been expected, but no doubt the action of hydrogen was responsible.

Dr. Offe displayed a plan showing extensive damage to his mains in the neighbourhood of the tramways, due no doubt to the effect of stray currents and unnecessarily abundant use of salt. He advises having damaged pipes examined carefully on the spot in collaboration with a chemist. It is not sufficient to sample a few handfuls of earth which may have been taken out of any part of the trench. Samples should be taken mostly from under the mains, where ferrous chloride and sodium chloride are often to be found. At the same time, clear evidence should be obtained as to whether stray currents are present, so that responsibility can be definitely fixed on the tramways.

FAULTY JOINTS IN RECUPERATOR FLUES.

How to locate and remedy defects in combustion flues was the subject next considered. Almost all settings, the author maintained, have faults in the recuperators, which are caused by the effects of various expansions and contractions, set up in heating-up or letting-down, or otherwise in the ordinary course of working. The effect on heating efficiency, or in waste of fuel, is far greater than is generally imagined.

In attempting to locate and remedy such faults, there are four possibilities. First, using an Orsat apparatus, the faulty flue, but not actually the faulty spot, can be located by a sudden fall of carbon dioxide and rise of oxygen in the waste gases.

Secondly, by building-in sight holes in the waste-gas flues, faults can be found quickly, but with no great exactitude. The author uses a tube about 2 in. in diameter and 20 in. long. In order that no air from without can penetrate into the flue, one opening is closed by means of a glass plate, which is held in place by a circular clamp which fits over the pipe. In many cases faults can be located at once, as they often appear as dark patches in the recuperators. But they are also present when the flues contain unburned gas, when blue carbon monoxide flames are to be observed. This method is considered quite good, but the building-in of the tubes and the observation require much time. Even so, not every fault will be revealed, and small ones are apt to escape notice.

A third possible method is to burn an ordinary gas flame inside the air flues and near the joints, at the same time observing the waste-gas flues. If the flame is too strongly drawn towards the latter, or if a flame appears in them, there is no doubt a serious leak. This method is, however, in no respect better than that last described.

The fourth way is to cause a flame to burn through, and so indicate, any joints which are not tight. If the gas pressure is insufficient, it must be increased; and a small machine with an electro-motor is recommended. Care must be taken, in constructing the burner, that a good steady flame is obtainable, which will not be extinguished in the parts where the oven draught makes itself felt. Also its end must be so curved that horizontal and vertical joints can without difficulty be illuminated. The installation in use at Cologne is easily transportable, being mounted on a table, and it includes a benzole carburettor. This consists of a cylindrical iron vessel which has a perforated plate just above where the gas enters. Above this plate the cylinder is packed with cotton wool which is supplied with benzole through a funnel in the removable lid. The carburetted compressed gas flame is found to give sufficient light, and it is also recommended because it requires considerably more air than the non-luminous flame. Small quantities of gas which, through faults, penetrate into the combustion flues will burn more obviously to the eye, the greater quantity of air they use.

The apparatus has answered excellently in practice. When any faults are present, unburned gas penetrates into the combustion flue, and is ignited, provided the latter is at red heat. If not, it must be ignited by a separate burner introduced through a small opening in the combustion flue. In eight vertical settings, which were tested and repaired by this method, the carbon dioxide contents of the waste gases increased on an average to 18·2 p.ct. In a few of them, the draught had to be reduced from 8½ to 6 mm., as they became too hot. The temperatures of the waste gases in six settings before and after repairs were as follows:

Setting No.	I.	..	580° C.	..	450° C.
,, ,,	II.	..	730°	..	400°
,, ,,	III.	..	620°	..	430°
,, ,,	IV.	..	510°	..	450°
,, ,,	V.	..	550°	..	450°
,, ,,	VI.	..	600°	..	430°

SULPHUR.

The fourth section of his paper, which Dr. Offe described as the most important, dealt with the removal, from purified gas, of organically combined sulphur. He referred in the first place to the well-known serious corrosive effect of the sulphurous acid in gas on calorimeters and heating apparatus which are constantly in use. The smell from the waste-gas outlet of a calorimeter indicates clearly the presence of sulphurous acid, and there is no doubt as to its influence on plants or flowers in a room. But of the greatest importance is its effect when gas is used for industrial and manufacturing purposes. This has come to the author's notice principally in connection with the glass-works in his neighbourhood. In

cases where gas is used for finishing-off the lips of drinking glasses, the effect of the sulphurous acid is to leave a bluish-white mark in the glass about half-a-centimetre below the rim. Among several other complaints, one is cited of the owner of a glass-works who had had gas installed at his own expense, which included the laying of about 3 kilometres (nearly two miles) of connections. Though he much preferred the ordinary gas supply for his works, he would have been compelled to close down, owing to the sulphurous acid trouble, had he not had available an auxiliary benzole-gas plant.

In seeking remedies, it is necessary to know what quantity of organic sulphur compounds there is in the gas, what they are, in what quantities they are harmful, and how they can be removed. In the gas supplied at Cologne, they amount to nearly 30 grammes per 100 cub.m. [131 grains per 1000 c.ft.]. Their exact nature naturally depends upon manufacturing methods, but they consist mainly (up to 95 p.ct.) of carbon bisulphide. The author suggests that they should be reduced at any rate below 10 grammes per 100 cub.m. in order not to be harmful.

In his search for a process which would be practicable, inexpensive, and simple, he tried first of all the effect of washing with concentrated milk of lime, both at ordinary temperatures and with heat. With coal gas and water gas, however, this gave no success. The next experiment was with the object of finding out whether any reaction, to form iron sulphide, could be obtained by passing the gas over hot iron shavings. The first attempt was full of promise, as the sulphur was reduced from 28 to 14 grammes in 100 cub.m. Indications were, however, that too high a temperature had been used; and, also, the presence of sulphuretted hydrogen after the heating process showed that a subsequent washing with soda solution or something of the kind would be necessary.

What reactions were taking place? It was possible to recognize and prove the separation of carbon and the formation of iron sulphide and sulphuretted hydrogen. In order to investigate the matter further, the gas was previously passed through carbon bisulphide, so that 20 litres [1000 litres = 1 cub.m.] of gas absorbed up to 30 grammes of it. The 300 grammes of iron shavings in the tube could not deal with the whole of this, but they took up 77 p.ct. of the first 60 grammes which were passed over them. In further experiments they dealt with 56 p.ct., when 100 grammes were passed through the tube. The products identified were: (1) Carbon, of which the iron material contained 4·4 p.ct. (2) Sulphur, which accounted for 16 p.ct. (3) In the subsequent soda solution wash there were mercaptans. (4) In the washed gas there were still sulphur compounds, which could be burned over platinum asbestos with accompanying separation of sulphur.

The author is of opinion that certain temperatures, and not very high ones, must be used, in order to remove all the sulphur dioxide, and, in the interests of the purifying material, that the process should work as far as possible according to the sulphuretted hydrogen reaction. The rest of the sulphur compounds, consisting of carbon, hydrogen, and sulphur, are only dissociated at higher temperatures. It is also possible that there is a subsequent re-association of some of the products.

In order to test whether the iron with 16 p.ct. of sulphur and 4·4 p.ct. of carbon was "exhausted," coal gas was passed over it while it was hot. Curiously enough, when 50 litres of gas had passed, the equivalent of 320 grammes of sulphur per 100 cub.m. was found as sulphuretted hydrogen in the soda solution, and 300 grammes still remained in the gas. It is possible that this was due to sulphur which had been separated out and had distilled over, and perhaps also hydrocarbons containing sulphur had been formed, which had not been broken up. At the next attempt, however, there was a reduction from 30 to 20 grammes of sulphur per 100 cub.m.

Dr. Offe suggests that, if these observations are followed up, an inexpensive and efficient plant may be evolved. If there is any difficulty in applying it on a large scale to the whole gas make, that portion of the output could be treated which is destined for consumption for certain industrial purposes where freedom from sulphur is essential. Besides the glass industry, he would suggest any use of gas in which the products of combustion come into contact with metals, as, for instance, in autogenous welding, or the manufacture of wire. Analyses of the gas before and after treatment show no material changes in the essentials which make for gas quality.

Coke-Oven Bye-Product Yields.—As the result of research work and improved methods of production, there have been large gains of recent years in the yields of bye-products in coke-oven practice, according to figures collected from selected plants, as quoted by Mr. Richard A. Pease (of Messrs. Pease and Partners, Ltd.), in his evidence before the Committee on Industry and Trade. These showed in 1913 a yield of 1·72 gallons of benzole per ton of coke produced, and in 1924 3·03 gallons per ton of coke from the same plants. For sulphate of ammonia, the figures were 1 ton of sulphate per 48 tons of coke in 1913, and 1 ton per 41 tons of coke in 1924. Of crude tar the yield in 1913 was 1 ton per 23 tons of coke, and in 1924 1 ton per 20 tons of coke.

NORTH BRITISH ASSOCIATION OF GAS MANAGERS.

Annual Report of the Council.

The following are the main portions of the report of the Council for the year 1924-25, which will be submitted at to-morrow's meeting in Dunfermline of the North British Association of Gas Managers.

MEMBERSHIP.

The membership of the Association on June 30 was 275, as compared with 266 at the close of the previous year—an increase of 9.

The Council regret to have to record the death of an extraordinary member, Mr. James A. Fraser, of Glasgow. The resignation of only one member falls to be intimated—Mr. P. Baxter, of the Barrowfield Ironworks, Glasgow.

The following candidates for membership have been passed by the Council, and are recommended for election at the annual general meeting: Ordinary members—Messrs. J. Livingstone, Tillicoultry; T. Royden, Uddingston; W. A. Dearden, Johnstone; and W. Heathcote, Kincardine-on-Forth. Extraordinary members—Mr. R. B. Robertson, of the Kyle Chemical Company, Glasgow.

HONORARY MEMBER.

The Council unanimously recommend that Mr. Alexander Yuill, ex-Engineer and Manager of the Dundee Corporation Gas Department, be elected an honorary member of the Association. During a long and honourable career Mr. Yuill has rendered distinguished service to the Association and to the gas industry.

INSTITUTION OF GAS ENGINEERS' DELEGATE.

Mr. John Wilson, Motherwell and Wishaw, has been appointed to represent the North British Association of Gas Managers on the Council of the Institution of Gas Engineers for the year 1925-26.

COMMERCIAL SECTION.

Western District.—The membership of the Section for the past year was 55—an increase of 2. Ten meetings were held in Glasgow, the average attendance being 21. The President during the past session was Mr. J. Dickson, of Kirkintilloch.

The policy of discussing special subjects was continued with success. These embraced "The Relationship between Housing Committees and Gas Authorities;" "Prepayment Meters—Liability of Consumers;" and "Painting of Gasholders."

The disposal of residuals, particularly coke, was very keenly discussed throughout the latter part of the session. Other matters of a routine nature also engaged the attention of the members.

The usual returns have been exchanged with the various commercial sections in Scotland and England.

(Signed) ARCHIBALD KELLOCK,
Hon. Secretary.

North-Eastern District.—During the past year there were five meetings. These were held at Perth, Cowdenbeath, Kirkcaldy, and Aberdeen, with an average attendance of 16. The membership stands at 51.

There were many problems facing the members, as there always are, but perhaps the most acute since the beginning of the year has been that of the coke market. Owing to heavy output, and through lack of export business, dullness in the industrial trade, and a very mild winter and spring, there was no demand, so that stocks accumulated to an excessive degree, with the result that, to make room, a considerable amount of undercutting took place. The hope is expressed that there may be a good export outlet; otherwise the position will become very serious.

Besides the usual discussions regarding residuals, the following items came in for special attention: "Coal and Power," "Showrooms—should they pay their own way?" "Tar and Bitumen Mixing," and "Housing Schemes."

R. S. JOHNSTON,
Hon. Secretary.

As official analyst to the Association, Mr. G. H. Gemmell, F.I.C., reports that during the year he received the undernoted samples for analysis.

Sulphate of Ammonia (19 *samples*).

Strength.	Maximum P.Ct.	Minimum P.Ct.	Average P.Ct.
Ammonia	25·42	24·05	24·27
Sulphate of ammonia	98·99	93·36	96·98
Moisture	6·45	0·81	2·49
Free acid	0·83	..	0·228

Spent Oxide (16 *samples*).

Strength.	Maximum P.Ct.	Minimum P.Ct.	Average P.Ct.
Sulphur on dry	65·20	23·41	52·04
Moisture	39·22	4·68	14·46
Prussian blue on dry	9·59	0·48	3·08
Tar	4·35	..	2·78

Ammoniacal liquor (12 samples).	Bog ore (3 samples).
Tar (5 samples).	Artificial oxides (1 sample).
Lime (2 samples).	Coal (4 samples).

FINANCIAL REPORT.

General Fund.—The expenditure from this fund amounted to £202 9s., and the income, including £25 entrance fees received from new extraordinary members, was £316 15s. 4d. There is

therefore a credit balance of £114 6s. 4d. on the year's working, which, with £220 12s. 8d. brought in at the beginning of the year, gives a total balance of £342 19s. at the credit of this fund. This amount includes £50 allocated a year ago to technical colleges, for provision of classes in gas engineering and supply, which is not yet disbursed. The Council recommend that a further grant of £50 be made from this fund to the technical colleges.

Benevolent Fund.—During the year a grant of £12 was made to the widow of a member, to assist her over temporary difficulties. The amount at credit of revenue account is £500 15s. 11d., and £586 4s. 9d. is invested in London and North-Eastern Railway 3 p.ct. debenture stock.

Research Fund.—Special subscriptions to this fund are not now asked for, but the sum of 11s. 6d. was received from two members. Outlays amounted to £10 10s., and the credit balance in bank is £8 11s. 7d. This fund will in future be merged in the general fund, and the credit balance transferred accordingly.

William Young Memorial Fund.—The amount at credit of revenue account is £132 13s. 11d. The sum of £654 14s. 3d. is invested in London and North-Eastern Railway 3 p.ct. debenture stock.

Accounts.—The amount at credit of revenue account is £142 5s. 4d.

WILLIAM YOUNG MEMORIAL LECTURE.

The Council have decided that no William Young Memorial Lecture shall be delivered at the annual general meeting.

INSTITUTION OF GAS ENGINEERS—SCHEME FOR EDUCATION AND CERTIFICATION OF GAS ENGINEERS.

During the past year the Council have given very close attention to the working of the above Education Scheme, and many points affecting the interests of Scottish students have been dealt with.

The Scottish Committee of Advice have been able to be of assistance to many students in advising courses of study, and in other directions; and it is hoped that full advantage will be taken of their services.

The courses of study arranged by the Royal Technical College, Glasgow, are now in operation; and the Principal of the Heriot-Watt College, Edinburgh, is now arranging courses of study to become operative in that College next winter session.

The numbers of students in attendance last session at the gas classes in the above Colleges were as follows: Glasgow—gas engineering, 24; gas supply, 22. Edinburgh—gas engineering, 11; gas supply, 23.

The question of financially assisting the Colleges has been very carefully considered, and proposals on this matter will shortly be put before the members.

It is with pleasure that record is made of the fact that the first Scottish student to obtain the Diploma of the Insitution of Gas Engineers is Mr. Duncan Melvin, Assistant at the Uddingston Gas-Works, a pupil of the Royal Technical College, Glasgow.

NATURAL GAS IN FRANCE.

A brief reference was made in the "JOURNAL" some time ago to the existence of natural gas in France; and that it does exist in considerable quantities in that country is proved by an interesting article in the "Journal des Usines à Gaz" for July 20, from which the following extracts are taken.

The article reminds us that natural gas was first applied at Fredonia, in the United States, in 1826, and that nowadays that country consumes more than 23¾ milliards of cubic metres per annum. In France the natural gas industry has recently been developed at Vaux-en-Bugey by the Société de Recherches et d'Exploitations Pétrolifères, whose headquarters are at No. 75, Boulevard Haussmann, Paris. Deposits of natural gas exist in two main forms, which differ very greatly, and comprise many variations. First, there are deposits under "rock pressure" (to use a classical Americanism); and, secondly, there are deposits under hydrostatic pressure. Normally it is impossible to tell immediately to which class belongs a newly-discovered deposit; this can only be decided by a more or less prolonged study of local geology and gas yield. As for the origin of the gas, many hypotheses have been put forward to explain it, and a fact which renders decision most difficult is that the gas makes its way along the rock strata, and is rarely discovered in the place of its formation. It usually reveals itself by a leakage through the earth's crust, or by accidental tapping of the deposit, as by a well or other boring.

On French territory there are many sites where natural leakage manifests the presence of gas—Dauphiné and Chatillon are examples; and it is hoped that one day these indications will reveal a store of new wealth beneath French soil. The most important source has proved to be at Vaux-en-Bugey, where the first indication was an inflow of gas into a salt-mine boring. The article points out that the natural gas industry might be considered an off-shoot of the petroleum industry, as they are prospected for together; but from the point of view of utilization, it must go hand in hand with town gas. In the States [as is well-known to "JOURNAL" readers] natural gas and manufactured gas are exploited as one, though it goes without saying that certain precautions are necessary to avoid inconveniencing the consumers through the varying compositions and calorific powers of the two gases.

The following figures give a comparison of a typical American natural gas with that of Vaux:

	Pittsburg. P.Ct.		Vaux. P.Ct.
Methane	80·85	..	80·60
Other hydrocarbons	14·00	..	11·10
Carbon monoxide	0·40	..	0·40
Hydrogen	0·10	..	0·00
Carbon dioxide	0·05	..	2·80
Nitrogen	4·60	..	5·1 (traces of H_2S.)

The calorific power is in the neighbourhood of 9500 calories, or double that of normal coal gas. While coal gas lends itself to debenzolization, natural gas often contains petroleum oils, of which it may be stripped. Rich gases are treated by compression or refrigeration; those of medium content are oil washed (at high or low pressure); poor gas (as such can be classed that of Vaux-en-Bugey) can only be stripped profitably by means of solid adsorption. The Société de Recherches et d'Exploitations Pétrolifères have built a works where they intend to apply special processes using an adsorbent of their own make.

EARLY DIFFICULTIES AND LOSSES.

The deposit of gas was discovered in 1907, when a well at Vaux-Fevroux, in the valley of the Buisin, struck a quantity of gas at 198 m. As the boring was full of water, there was a very violent eruption, followed by a fire due to the carelessness of an employee. This fire, however, was of short duration, for the emissions were intermittent; the boring being periodically flooded out by water from the upper strata. As it was impracticable to tamp the springs, it proved quite impossible to control the gas; and the well was abandoned. Intermittent eruptions of gas, however, continued up to 1922—that is to say, for fifteen years—and it is impossible to put a value upon the quantity which was thus lost. Work was not recommenced in the Vaux Valley until 1919, when petroleum prospecting was undertaken.

Two Companies established their plant a few hundred metres from one another. One, the Société Civile des Recherches de Vaux quickly found gas at a depth of 200 m., but could not control it because of flooding. The second Company, the Société d'Etudes et de Recherches Pétrolifères, which has since become the concessionary undertaking (with the title Société de Recherches et d'Exploitations Pétrolifères), at the same time drove-down 456 m. without coming across any sign of gas. Patience was exercised, and a new 700-m. boring was begun on higher ground, gas being struck at 217 m. The shaft was perfectly tight, and the station was provided with the latest plant, so here was a practical proposition. But the Company preferred to drive deeper, in the hope of increasing the yield of gas (which amounted to no more than 14,000 cub.m. per day) or of striking oil. With great difficulty the well was driven to 223 m.; and in August, 1921, a considerable quantity of gas was found. The yield amounted to 150,000 to 200,000 cub.m. per 24 hours; the gas flowing freely and continuously. However, the difficulty of obtaining the necessary plant in France—especially valves strong enough to withstand the pressure—caused a further delay of three months before definite control was achieved; and during this time there was unfortunately a considerable loss of gas, which nevertheless had the advantage of showing how important was the discovery. When finally the valve was shut-down for the first time, the pressure reached 10 kg. in ten minutes, 13 kg. in three hours, and 14 kg. at the end of eight days; and it continued to rise, albeit slowly, for two months, until it reached 15·5 kg. At this point cracks revealed themselves in the ground, rendering the site dangerous; and it was deemed advisable to instal a safety valve to bring back the pressure to 14 kg. Numerous other wells have since been sunk by the Société de Recherches et d'Exploitations Pétrolifères, and all have yielded gas, but in rather less quantities than the No. 2 well.

A DEVELOPING DISTRICT.

The first application of the gas was for running the boiler plants on the different sites; but in view of the encouraging results, the Company did not hesitate to take the necessary steps for distributing the gas in the Vaux Valley, and as far as neighbouring industrial centres. A pipeline of Mannesmann welded tubes, tested to 30 kg., has supplied Ambérieu-en-Bugey since July, 1923; and a large glass works at Lagnieu, connected with the Saint-Gobain Company, now take a supply. The gas from the wells is expanded to 3 kg. at the first distribution station, and is then sent to the oil-stripping station through a 150 mm. main 3·9 km. long. There the gas, still under natural pressure of some kilograms, is divided into two lines. The first, 60 mm. in diameter and 4·6 km. long, supplies Ambérieu; the second, 150 mm. in diameter and 3 km. long, supplies Lagnieu. The glass works consume about 10,000 cub.m. of gas per day, using it for a 12-ton and a 6-ton pot and a 150-H.P. Dujardin engine. The gas will in due course be used for various other purposes—such as the machines distributing the glass round the works and for reheating furnaces, &c. At Ambérieu the gas is governed-down and passed into the holders of the old works, the retort-settings at which have been now shut-down.

Besides these applications on a large scale to industry, the undertaking has met with success in supplying gas for various purposes, such as heating and lighting of isolated houses by means of 150-kg. pressure cylinders, the replacing of motor spirit, &c.

BRITISH ASSOCIATION MEETING AT SOUTHAMPTON.

An Attendance of about 1700.

ONE or two matters in which readers of the "JOURNAL" have an interest were considered at last week's Annual Meeting of the British Association for the Advancement of Science, which was held at Southampton, under the Presidency of Prof. Horace Lamb. The meeting next year will be in Oxford, under the Presidency of H.R.H. the Prince of Wales; and an invitation to meet in Leeds in 1927 has been accepted.

STANDARDIZATION.

On Monday, Mr. C. le Maistre, Secretary of the British Engineering Standards Association, read a paper in which he dealt with the present position of standardization generally, and again referred to the new scheme of subscriptions to which attention has already been drawn on more than one occasion recently.

After referring to the need for greater economy in industry by the elimination of waste and excessive diversity of parts through the medium of standardization, he referred to the fact that during the past 25 years the "B.E.S.A." have carried out a great deal of most useful work in industrial standardization. The simplification and standardization of steel sections resulted in a saving of 5s. per ton to the steel industry, while recently a single electrical specification resulted in a saving of £10,000 in the stock which one Company alone had to carry—or a continuous saving of £500 per annum. Since the war many other countries had instituted national organizations; and in practically all cases they had drawn on the experience of the "B.E.S.A." In the U.S.A., in addition to a standardization organization, there had been instituted by the Government a Division of Simplified Practice, which was a Government campaign towards the elimination of national waste, under the Department of Commerce, of which Mr. Secretary Hoover was the inspiration. The procedure of that Department is based almost entirely on that of the "B.E.S.A.," with the exception that it is financed entirely by the Government, and the term simplification has been adopted as being more commercially significant than our term of standardization.

Among the results of these efforts, which began in 1921 in the U.S.A. were the following. The American milling cutter industry, after months of study and survey, made a reduction of 35 p.ct. in prices. A reduction of 50 p.ct. has been made in the sheet-metal industry so far as the varieties which have to be stocked by the ironmongers—or jobbers, as they are called in the States—are concerned. Again, in the china trade, the paper bag industry, the lumber industry, and many others are to be found examples of reductions in varieties, and consequently in prices, through the application of the principles of simplified practice, upon which the U.S.A. Government are now spending £20,000 per annum.

After pointing the directions in which similar results can be achieved in this country through the medium of the "B.E.S.A.," a plea was made for a greater measure of financial support for the work being, and to be, done. At present the general funds are provided largely by industry and, to a very small extent, by the Government—to be exact, £100 per annum. The Association is not a profit-making concern, and all the expenses are for office accommodation, staff salaries, and so on, amounting to £16,000 per annum. Manufacturers also help in many ways other than in providing money; and it is computed that the total value of the support given by industry is about £40,000 per annum. Assistance is also rendered by the Governments of the Overseas Dominions, including the Government of India and the Crown Agents for the Colonies. Considering, however, the large sums being devoted to similar work in the United States and other countries, the hope is expressed that the British Government will recognize the entire appropriateness of increasing their support of this much-needed national work, so that it may no longer be as hampered as it now is in its activities for the benefit of industry.

Many thousands of copies of British standard specifications have been translated into foreign languages, in an endeavour to assist British trade abroad; but at the moment this work has had to cease on account of lack of funds.

In order to widen the scope of the membership, the Main Committee will, in October, put into operation a scheme for the reorganization of the membership. The members of technical committees of the Association are to be known as honorary members, and a new class of membership is being introduced to include professional engineers, individual firms, and business men connected with the great industries of the country, who are to be invited to become members at a minimum annual subscription of two guineas. The income from this new source is to be used more particularly towards making the home work effective throughout the world. Some of the representatives of the trade organizations who have taken part in drawing-up this scheme have already intimated their willingness to continue their present very considerable contributions and, at the same time, to recommend to their constituent members the great desirability of applying for membership of the "B.E.S.A.," thus enhancing the value of the trade contributions and assisting the Association to widen their scope.

IGNITION OF GASES.

On Friday morning, there was a joint discussion by Section B (Chemistry) and Section G (Engineering) on "The Ignition of Gases," opened by Prof. H. B. DIXON, F.R.S.

Prof. DIXON, in a brief historical account of the work done in connection with the ignition of gases, said that it was Bunsen's work which had really set the ball rolling. In making experiments on the pressure produced in the explosion of hydrogen and oxygen, Bunsen came to two conclusions, which he (Prof. Dixon) regarded as rather contradictory. The first conclusion was that, when a mixture was exploded by a spark running through a little tube, about 4 in. long, and the spark was sent the whole way through, only one-third of the gas was able to combine. After a short interval it cooled a little, and another one-third exploded, and finally the remaining one-third exploded. Thus, there were three successive partial combustions or explosions. Bunsen had no other evidence than the fact that the pressure he was able to record was just one-third of that which he had expected, theoretically, from the heat of combination of the hydrogen and oxygen, and the supposed specific heats. Bunsen's second dictum—Prof. Dixon did not know on what evidence it was based—was that the spread of the flame in an explosion was synchronous with complete combustion, so that one could not have a flame going through and leaving unburnt gas behind it. How Bunsen had reconciled this second statement with the first, he had not indicated.

In this connection Prof. Dixon referred to a photograph of an explosion, taken by one of Bunsen's students. One could not see the flame at all in the photograph, but what one could see were the little pieces of broken glass thrown about in the tube in which the explosion took place, which were heated-up by the flame, which was itself invisible.

What he believed to be the first photograph of an explosion ever published was then shown. This was a picture of the initial portions of an explosion of a mixture of gases, taken by Le Chatelier. Le Chatelier had made several mixtures of hydrogen and oxygen, and methane and oxygen, and had passed them into heated vessels at a determined temperature, and observed whether the gases exploded or not. He had been the first to show that with a mixture of 70 p.ct. of hydrogen and 30 p.ct. of oxygen, the temperature of ignition, when the gases were allowed to pass into a hot tube, was 560° C. When the hydrogen was 35 p.ct. and the oxygen 65 p.ct., the temperature fell to 529° C. In the case of methane and oxygen, he had shown that with a mixture of 70 p.ct. of methane and 30 p.ct. of oxygen, and, on other hand, 30 p.ct. of methane and 70 p.ct. of oxygen, the position was reversed. With the smaller amount of oxygen, the temperature was 650° C., and with the larger amount of oxygen it was 680° C. Bunsen had published those two sets of figures without drawing particular attention to them; but they were important.

Bunsen had laid emphasis on another fact of considerable importance—namely, that there was a certain lag in the ignition of the methane. It was after 2 seconds that the gas was ignited. A photograph, taken by a German, of an explosion wave was then shown, and Prof. Dixon pointed out that the German worker had missed the point. The photograph showed the spark at the bottom of the tube, and the flame travelling slowly, but gradually increasing in velocity. The sound wave travelled quicker than the flame itself, and, being reflected back from the walls of the tube, it checked the flame. Photographs demonstrated that the flame went right through the mixture before it was visible, and Bunsen's dictum, that the spreading of the flame was synchronous with complete combustion, was totally wrong.

Prof. Dixon then dealt with some experiments on the ignition of gases which have been made during the past three years for the Safety in Mines Research Board, and discussed adiabatic compression. Photographs of flames produced by this compression were shown; and these illustrated that the ignition point is not that at which the flame is visible, but that at which it begins to self-heat rapidly, and brings itself up to the actual combustion, when the flame is seen. Sometimes this is a gradual process. In the experiments described, mixtures of methane and air, and of hydrogen and oxygen, were fired by rapid compression in steel cylinders by a piston which can be stopped, and held rigidly, at any desired position in the cylinder. By trial, there is found a compression which will just fire the mixture. With a rapid, self-heating mixture (e.g., electrolytic gas) the clamping of the piston at the end of its stroke has a small but measurable effect. With a slow self-heating mixture (e.g., methane and air), the clamping of the piston makes an important difference, since the gas, during the period of self-heating, has time to do work on the piston. When oxygen is

added to electrolytic gas, the ignition point, as calculated from the compression, is continuously lowered; with methane-air mixtures the ignition point is slightly reduced as the air is increased from 90·5 p.ct. (the volume for complete combustion) to 93 p.ct., after which the ignition point rapidly rises.

Dealing with concentric tube experiments, the author said that when a stream of inflammable gas from a narrow central tube is made to enter an atmosphere of air or oxygen in a large cylinder, both gases being heated equally before meeting, the gas will ignite very rapidly (under 15 seconds) on escaping from the orifice, so long as the temperature is maintained above a critical point. On allowing the furnace to cool sufficiently, an appreciable time interval occurs between the turning-on of the gas and its ignition. This gradually increasing "lag" is noted until the gas fails to ignite in 10 or in 15 seconds. The cylinder is then slowly heated, and a series of diminishing lags is recorded, until the gas ignites again in less than 0·5 second. The means of the falling and rising temperatures observed at corresponding lags are taken as single readings. A steel case has been made to contain the electric furnace and silica cylinder, so that ignitions may be observed under both increased and diminished pressure. An increase in pressure, as a rule, lowers the ignition point of gases, as indicated by theory; but in many cases, notably with hydrogen, a diminution of pressure down to one-tenth of an atmosphere causes a continuous lowering of the rapid ignition point.

As to incipient combustion, most gases show some visible signs of partial combustion before normal inflammation—notably methane. But the only gases with which the experimenters have been able to stabilize these incipient flames are mixtures containing carbon disulphide or ether.

Work at Leeds.

Prof. W. T. DAVID referred to some work being carried out at Leeds upon an apparatus in which spontaneous ignition temperatures of inflammable gaseous mixtures are determined by means of adiabatic compression produced by the flow of compressed air into a tube in which the inflammable mixtures are contained. Preliminary experiments with this apparatus show that the spontaneous ignition temperature varies with the pressure. For a 26·5 p.ct. mixture of methane and oxygen, the following results were obtained:

Initial pressure of mixture (atmospheres) .	0·25	0·5	0·75	1·0
Minimum final pressure at which ignition took place (atmospheres)	10·25	13·2	15·75	21·0
Ignition temperature (° C.)	475	400	370	355

Thus, in mixtures of methane and oxygen, the ignition temperature is decreased as the pressure is increased.

Experiments are being made upon the ignition temperatures of inflammable mixtures diluted with nitrogen and other gases, but they have not yet progressed sufficiently to enable results to be given.

It is possible that the experiments with nitrogen may yield results of great interest, in view of investigations which, in conjunction with Messrs. S. G. Richardson and W. Davies, the author has been making upon the effect of radiation on the rate of combustion of inflammable gaseous mixtures contained in a closed vessel. These experiments show that the introduction of infra-red radiation into the reacting system speeds-up combustion, provided (1) that the radiation introduced is of the kind which can be absorbed by the combustible gas, and (2) that nitrogen is present in the gaseous mixtures.

Thus the rate of combustion of mixtures of CO and oxygen and nitrogen is speeded up by 4·4μ radiation (which is absorbed by CO), while that of mixtures of CH_4 and oxygen and nitrogen is speeded up by 3·2μ radiation (which is absorbed by CH_4). Hydrogen has no absorption bands; and it is found that the introduction of radiation does not affect the rate of combustion of mixtures of H_2 and air. No speeding-up of combustion is found in any of these mixtures when the nitrogen is replaced by oxygen, argon, or CO_2.

Perhaps the most remarkable result obtained from the experiments is that different types of radiation produce speeding-up in the CH_4 and CO mixtures. Thus the effect of radiation is not due to the inhibiting of formation of oxides of nitrogen; for if this were the case, the same type of radiation should be effective, whatever the nature of the combustible gas. Rather, the experiments suggest that some kind of temporary association between nitrogen and the combustible gas normally takes place during explosion, which association tends to be inhibited when the combustible gas is stimulated by radiation.

Prof. David added that, though his apparatus would not give the accurate results which Prof. Dixon's apparatus would, yet he thought it would give comparative results of some value. So far he had not done a great deal, but he had worked with methane and oxygen, and had found that as the pressure was increased the ignition temperature was reduced. So far as he could see at present, the theories he had indicated would explain a great many of Prof. Bone's experimental facts, provided it were assumed that this temporary association, to which he had referred, increased when the initial density was increased—in other words, that such a temporary association between nitrogen and the combustible gas was a function of the pressure. This would explain many of Prof. Bone's results, but it would not support his views as to the mechanism of the nitrogen activation. The outstanding result obtained by Prof. Bone was that, in the case of mixtures of CO and oxygen and nitrogen, the time of explosion increased as the initial pressure was increased, but that in the case of all other mixtures the time of explosion was decreased as the pressure was increased. Prof. Bone had suggested that the nitrogen absorbed the peculiar radiation emitted by the CO during its burning to CO_2, and, by acting as a storehouse for the energy emitted by the burning CO, in some curious way damped-down the rate of combustion. Prof. David, however, had one experiment which rather negatived that view. He took an explosion vessel the interior surface of which was first silver plated, and he afterwards used it with a black interior surface. Using identically the same mixture of carbon monoxide, oxygen, and nitrogen, he found that the rate of combustion was considerably greater when using the polished interior than when using the black interior; and there was no doubt whatever that the radiation density was very much greater than in the black vessel. It seemed to him that, if the view that nitrogen absorbed the radiation emitted by burning CO was correct, there should be a sharp explosion in the polished vessel, because the radiation density in the higher density mixture used by Prof. Bone increased with the initial density.

Flame in Closed Vessels.

Dr. O. C. de C. ELLIS, in some "Notes on the Production of Flame in Closed Vessels," said that when ignition of a combustible mixture occurs in a closed vessel, the rate at which the flame begins to spread is compounded of the rate at which the ignition is communicated from layer to layer of the mixture, and the rate at which the mixture just about to be burnt moves under the expansive force of the burning mixture. The rate at which the flame begins to spread away from the source of ignition is therefore but little different whether the vessel be virtually without walls (as with a soap-bubble), or closed, for the initial combustion takes place at constant pressure. This state of affairs persists in a closed vessel for only a very short time. Then the existence of the enclosure manifests itelf.

The first influence of the enclosure is on the direction of expansion of the burning gas, which is towards the more open space. If the enclosure has an opening in it, the mean movement of the flame is towards that opening, and the flame will not travel through the more remote, completely enclosed, part of the vessel until its other boundary has passed through the opening. In a strictly closed vessel the flame spreads from the region of ignition as if to reach all parts of the boundary at the same time. This is only a strong tendency, however, and is not actually accomplished except when ignition is central and the vessel spherical. It does not occur even then if the rate of spread of flame is so slow that convection currents can influence it. In such circumstances the flame-front travels upwards more quickly than downwards.

The second effect of the enclosure, very marked in small vessels, is the production of a second phase of slower propagation, following the first rapid spread of the flame. In the first phase, propagation is assisted, in respect of spatial displacement, by expansion; in the second, it is probable that propagation takes place against a slight recoil. In the first phase the gas burning is of low density; in the second, the gas is burning under higher and increasing pressure. It is the second phase which is indicated in a gas explosion by the fairly straight portion of the ascending line of the time-pressure curve.

The third effect of the enclosure, most marked in rich mixtures, takes place among the flame products, and is noticeable as a glow occupying the space where originally the flame passed during its first phase—*i.e.*, it commences near the point of ignition. It begins, moreover, well before the flame has completed its passage throughout the vessel, so that it is not an effect of cooling. A dark zone runs between the flame-front and this glow at the core, suggesting that the glowing material comprises the products of combustion of the first phase, and the dark zone those of the second.

As soon as the flame reaches the boundary of the vessel, the dark zone must cool, and therefore contract. For this reason, presumably, the flow now expands to fill the entire vessel. It may, and usually does, persist for a period many times as great as that necessary for the complete spread of the flame through the sphere. During this post-flame period, its volume gradually grows less, and its mass-centre rises.

These effects are not dependent on the presence of nitrogen, nor are they a manifestation of changes in the water-gas equilibrium. It can be assumed that, with such a mixture as CO_2+O_2+4CO the dissociation of carbon dioxide is very slight, but this mixture (when saturated with water vapour at 22° C.) exhibits the glow very markedly. The mixture $2CO+O_2+5CO$ gives an even denser afterglow of approximately the same duration—namely, about 13 times that of the flame period. With $2CO+O_2+6CO$ the duration is nearly 5 times that of the flame period, and with $2CO+O_2+7CO$ nearly 3 times. That the glow is a concomitant of dissociation is thus the least likely of the several explanations which may be advanced.

Comparable with the mixture $2CO+O_2+4CO$ already referred to, experiments have been made with a saturation of water vapour at 45° C. The glow is still very marked, but it is strikingly less both in density and duration. This latter fact

suggests a third explanation—that burning takes place in the mixture after the flame has passed through it. Certainly radiations that can affect a photographic plate occur after flame has travelled through the mixture. It is conceivable that these radiations are due to the subsequent burning of a combustible gas which has escaped the passage of the flame. Experiments to test the possibility of such "residual burning" occurring are in progress. This work is being carried out for the Safety in Mines Research Board, under the direction of Prof. R. V. Wheeler.

Mr. E. B. WOOD said that what little work he had done had been on the ignition in a petrol engine; and the times concerned there were very much shorter than those in the case of the investigators who had already addressed the meeting. He was particularly interested in the question of the lag, because he had found there was a period when nothing at all seemed to happen. The period in the case of the work he had done was about one-thousandth of a second with an engine speed of 1000 to 2000 r.p.m.; but he rather suspected that the temperature of both the charge and the hot spots might affect the time of the preliminary lag. As regards Prof. David's work, he should imagine that the hot exhaust valve might give the infra-red radiation which it was suggested speeded-up the rate of combustion.

Dr. E. K. RIDEAL, referring to the tentative explanation of Prof. David's results—viz., that there is an association of the original nitrogen with the original unburned reactant—suggested that there might be an alternative explanation, if they accepted Bone's view that the nitrogen can act as a reservoir of energy by the absorption of radiation. It was known fairly conclusively that the active nitrogen molecules must be activated to several definite stages, and that there were several stages of active nitrogen corresponding to different quantum levels. Let them assume that this active nitrogen could communicate its energy to carbon monoxide or hydrogen, as the case might be, by direct collision. Nitrogen molecules of a low state of excitation would not bring a hydrogen molecule, by collision, into its reactive state, because the original hydrogen would not have sufficient energy. Supposing, however, the nitrogen molecule was activated to such an extent that it would, by contact or collision with a hydrogen molecule, bring it very near to its reactive state. Perhaps the energy required to produce reactive CO was produced in two ways—first, by the radiation that was being drawn in, and, secondly, from the nitrogen molecules which had already been activated by the radiation given out in combustion a little beforehand.

Dr. A. C. G. EGERTON remarked that in some experiments he was carrying out he also had noticed the great influence of nitrogen on the explosion. He had found detonation to be delayed by the presence of nitrogen, while if nitrogen was replaced by argon, the detonation occurred considerably earlier. When oxygen was used instead of argon, the detonation was a little earlier still. He was working with acetylene and oxygen; and it might be that nitrogen had a greater effect in relation to acetylene than to other gases.

Prof. DIXON, replying to the discussion, said it was interesting to find so many people working on his old subject. He wished he could answer the question as to the interaction of nitrogen and CO. He himself was working on CO; but the work was by no means completed. All he could say for the moment was that the initial burning of CO was one of the most beautiful things he had ever seen. He had not gone very much into the question of the lowering of the ignition point with the lowering of pressure. It might be due to radiation; but there were some who held an ionisation theory.

RECENT PROGRESS IN THE PEAT PROBLEM.

At Thursday's meeting of Section B. (Chemistry), a paper dealing with the peat problem was presented by Dr. MOLLWO PERKIN. The author referred to the many failures there have been in endeavouring to deal with the commercial marketing of peat, and described a new system which he admitted is based upon the failures of the past, and for that reason could not be claimed to be original. For the recovery of bye-products or for use as a fuel, he said, it was necessary to dry peat down to 20 p.ct. or less of moisture, especially if peat coke was to be one of the bye-products. The quantity of peat in the United Kingdom and Ireland amounted to over 8,000,000 acres of an average depth of 12 to 14 ft., though it was frequently found at a depth of 21 to 25 ft. Probably each acre would yield from 3000 to 3500 tons of such dried peat.

The failures of the past had been due to many reasons, but, speaking generally, to the difficulties of removing water. Most systems had been based upon the extraction of moisture either by air drying—a very lengthy process—or by heating the peat in closed chambers; but both these methods had been economic failures.

Many ways had been suggested for getting rid of the bulk of the water from peat, and they could be roughly classified as follows: 1, Macerating; 2, heating and compressing; 3, electrical; 4, chemical; 5, macerating, heating under pressure, and briquetting.

Macerating had been adopted for a number of years in Denmark, and by the Low Temperature Carbonisation Company in Dumfriesshire, as well as in Sweden; but it had not proved to be economical. Peat properly treated, however, could, when briquetted, be successfully used on a low-temperature distillation plant for the production of charcoal for metallurgical purposes, oils and wax, sulphate of ammonia, and acetic acid. To obtain a hard briquette, and subsequently charcoal which could be used for metallurgical purposes, it was necessary for the pulping to be thorough—*i.e.*, the cell structure must be thoroughly broken down. It was also advisable to dry slowly, otherwise the briquettes became distorted and fissured.

After reviewing various processes which have been the subject of patent specifications and, in some cases, practical application—though it was suggested that none had been a commercial success—it was stated that the Power Gas Corporation had plants working in Italy which were giving good results. It was claimed by the Power Gas Corporation that with a peat containing a high nitrogen content, the sulphate of ammonia produced more than paid all the costs, so that the power gas cost practically nothing. In this connection, however, attention was called to the heavy capital expenditure.

From the experimental work he has carried out, Dr. Perkin put forward the following figures as showing the relative heat values to be obtained from anthracite, Derby Brights coals, and peat:

Anthracite	100 p.ct.	..	14,528 B.Th.U. per ton
Derby Brights. . .	99·21 ,,	..	14,414 ,, ,,
Anthracite briquette (sulphate binder) .	96·31 ,,	..	13,992 ,, ,,
Anthracite briquette (pitch binder) . .	91·59 ,,	..	13,307 ,, ,,
Bituminous briquette (pitch binder) . .	76·70 ,,	..	11,144 ,, ,,
Concentrated peat .	64·37 ,,	..	9,353 ,, ,,

Dr. Perkin claimed that it was now possible to produce peat commercially at a price much lower than that of coal, and it would be a pity to allow other nations to be the first to work it on a proper scale. British peat, as he had proved by a number of analyses, was superior in all respects to European and other peats; and now was the time to start a new home industry and, to some extent at least, to reduce unemployment. Peat would in no way interfere with the coal industry. If worked on a large scale, a number of labourers and engineers would be employed. It was not a question of mining—underground work—but one of cutting by machinery. Coal would always be required for the gas industry; and shortly, no doubt, it would be required for low-temperature distillation. From peat they obtained cheap briquettes which were smokeless, and a valuable charcoal for metallurgical purposes, which was also useful as a decolorizing agent; and in addition there were produced oils for motor purposes, lighting, and fuel. There were millions of tons of peat to be worked in the United Kingdom; and, on the average, the peat was very low in sulphur and phosphorus. The specific gravity of well-briquetted peat was about that of coal, so that there would not be higher freightage. As a matter of fact, as the value per ton was lower than that of coal, the freightage was less. For power purposes, too, peat was an ideal fuel for the production of electricity, and was cheaper than coal, as it was not necessary to reduce the moisture below 30 to 40 p.ct.

There were other uses to which peat might be put, and a great deal of experimental work had been done. So far, however, these processes had not been carried out on a sufficiently large scale to prove whether they would be commercially successful. For example, it had been suggested to manufacture alcohol by a process of fermentation; and this had actually been done. Paper had also been made from peat pulp, but the great difficulty had been to get rid of the enormous quantity of water with which peat was always accompanied. Dr. Perkin claimed to be able to briquette peat in a manner which would enable it to be used for many purposes on a commercial scale, and to compete with coal in some respects.

"My Life's Battles."—Messrs. George Newnes Limited have published (at 3s. 6d.) a book bearing the above title written by Mr. Will Thorne, M.P. This book, in which the author tells of his early struggles to earn a livelihood, contains an interesting account of the birth and growth of trade unionism in this country. There is a foreword by Mr. Clynes.

German Dye Industry.—In a report of the American Consul in Berlin, sent to the United States Trade Department and dealing with the German dye industry, it is remarked that the former German dye monopoly, which covered the world, has now been broken—states the Berlin correspondent of the Exchange Telegraph Company. A comparison of the official German figures shows that in the first three months of this year the export was 2144 metric tons, against 31,594 metric tons in 1913. The export in the first three months of 1922 was 15,257 tons, in 1923 it was 11,464, and in the same period of 1924 it dropped to 9832. The chief reasons for the decrease of German dye exports are stated to be the steady development of the dye industries in other countries, the changed commercial conditions, and the protectionist measures of many European countries which had succeeded during the war in establishing their own markets in Spain, Portugal, and other countries.

GAS USED FOR "CRACKING-OFF" GLASS.

There is in the area of supply of the Public Service Company of Northern Illinois an extensive glass plant whose chief products are no less than 75 varieties of illuminating glassware for indoor and outdoor use; and into the process of manufacture gas has been brought with highly satisfactory results.

An article describing what has been accomplished in this direction has been contributed by Mr. R. A. Hastings, of the Public Service Company's Industrial Gas Department, who outlines the processes carried out, from the mixing of the sand and flux onwards. After the blowing and annealing, the various glass shapes undergo what is termed "cracking-off," for which suitable methods are essential, in order to avoid extravagant waste. Originally a diamond-point cutter was employed for the purpose; and then an endeavour was made to utilize the physical properties of the glass itself. Glass is a poor conductor of heat; and when one surface is heated it will expand, while the opposite surface remains constant—this condition producing a strain which shears the section. By making use of this physical property, the problem resolved itself into a question of heat application. Oxygen and acetylene were experimented with, but gave rise to a number of difficulties. Then gas, which was already in use in the factory, was called upon, and new equipment was designed which entirely met the needs of the case.

In order to maintain the maximum speed of production, it was found to be necessary to deliver a large quantity of gas through the burner tips and apply it in the form of a pin-point flame. The requirements proved unattainable with burners of ordinary construction, and so the burner tips were made 6 in. long and $\frac{1}{2}$ in. in diameter, with a $\frac{1}{8}$-in. orifice in the centre and a $\frac{1}{16}$ in. wide ribbon burner round this central orifice. The gas to the ribbon burner is supplied through specially designed ports which retard the velocity and give a perfect pilot light surrounding the high-velocity gas released from the central orifice. Eight of these burner tips are mounted on a semi-circular manifold, in such a manner as to unite the ends of each of the flames and form one central spot of concentrated heat. There are altogether ten machines—of a vertical type for larger single units, and horizontal for smaller units. All have essentially the same burner equipment, which is adjustable in four directions. To assist in breaking after the flame heats the glass, an iron with heat-conducting qualities is brought in contact with the heated area, producing a negative stress to the expansion; and the resultant effect is a square cut, with no grooved edges.

This method of operation has increased production to the extent that the limiting factor is the speed at which the operator can shift the glass units on and off the machine.

CORRESPONDENCE.

[*We are not responsible for opinions expressed by Correspondents.*]

Electric v. Gas Heating.

SIR,—I was very much interested in the recent comments by the writer of the "Electricity Supply Memoranda" on my letter in the issue of the "Electrical Times" for July 30 on the subject of "Electric v. Gas Heating," and should like to reply to some of the points he raises.

First, with regard to the "perfect humbug" of claiming 100 p.ct. thermal efficiency for the electric fire, will he kindly state just what becomes of the energy the electric radiator fails to convert into heat? I rather fancy that he will have either to disprove the theory of the conservation of energy, or to admit that all forms of electric heaters have an efficiency of 100 p.ct. Even the minute proportion of energy converted into light reappears as heat on absorption.

With regard to his claim of 25 p.ct. convected heat for the gas fire, it is just this that I take leave to doubt. I should be interested to hear exactly how the gas fire propagates such an amount of convected heat into the room. If any air which has been warmed by being passed over the radiants (and I see no other way in which it could be warmed) is circulated into the room, then the products of combustion must likewise be escaping and poisoning the atmosphere. I admit the possibility of a very slight amount of convective heating from the framework of the fire; but this must fall very far short of 25 p.ct., and in any case the modern gas fire, notably the imitation-coal type, has a minimum of framework. I have a modern gas fire fixed in a disused bedroom, and I have repeatedly tried in vain to experience the slightest amount of warm air rising into the room from it. In this connection I would quote the following extract from an advertisement of a leading manufacturer of gas fires which appeared in an issue of the "GAS JOURNAL" in which was published a previous letter of mine: "All products of combustion are vented, and only radiant heat can enter the room."

With regard to the probability of my not having "the capacity of Dr. Fishenden for making actual measurement of heat performances," I believe the experiments I criticized were performed with human subjects, and not scientific measurement.

In conclusion, since the writer of the comments in question ignored the point in my original letter, I had better repeat that enormous economy results from placing the electric fire just where it is needed, in a way which can be done with no other form of heating.

CUISINIER.

Aug. 22, 1925.

The contributor of "Electricity Supply Memoranda" has had a copy of the foregoing letter sent to him. Regarding it, he writes: "Being on holiday, and not having much recollection (being unable to refresh my memory by reference) of the points of the comment on 'Cuisinier's' last effort, it is impossible for me to say how far he has covered my criticisms. I am not willing to spend time and occupy space discussing the theory of the conservation of energy, any more than I am prepared to waste time in showing our correspondent that every type of electric heater is not such a perfect instrument as a calorimeter, and that every type of electric heater cannot claim to be so perfect that it gives 100 p.ct. useful efficiency, as some electricians claim. If that were so, then there would be nothing to choose between one design and another, other than appearance and price. The whole of 'Cuisinier's' letter shows how little he knows about the science of heat. He thinks there is only a slight amount of convected heat from the framework of an ordinary gas fire, which, he says, has been reduced to the minimum. But what about the framework of the electric fire, which in most cases is of biscuit-box lightness and fragility? Again, he has repeatedly tried in vain to experience the slightest amount of warm air rising from the framework of a gas fire. Now, instead of wasting time over this amateurish nonsense of his, if he will let me know the next occasion he is in London, and can spare the time, I will make arrangements for him to show his capacity in making actual tests of electric fires, calorimetric tests of gas, radiant heat tests of gas fires, the flow of the products of combustion through the flue vent, and chemical tests of the products. He will then obtain information as to the heat passing away in the products. That heat, *plus* the radiant heat, will give him the amount of convected heat that is being usefully passed into the room. Chemical means will also be available to show that, with present-day constructions, there are no products of combustion passing into the room. These tests will give our friend something more exact than his present quack methods, and will, I hope, help to correct his ill-founded beliefs and doubts. It is useless discussing matters with anyone who confesses that his knowledge and assumptions are based on such insecure foundations as are found in his letter. If 'Cuisinier' will accept the invitation, I shall be pleased faithfully to broadcast the results—not only to readers of the 'JOURNAL,' but to the electrical papers, if they will publish them."

Tar v. Bitumen.

SIR,—I am sorry to have ruffled "Motorist's" temper by asking whether he is interested in bitumen. I, of course, accept his denial unreservedly, and apologize. He suffers the usual disability of those whose names are so august that they may not be published. Apologies are also due, perhaps, to the bitumen interests for my having thought it possible for them to take the further step downwards in the quality of their arguments which their authorship of his remarks would have entailed.

I am not interested in the materials used at Brooklands; and, so far as I am concerned, they may pave the track with diamonds.

I know "Motorist" has not admitted that tar is better than bitumen. I have offered evidence of this, if "Motorist" will take the trouble to get it. But, after all, as a schoolboy would say, "He began it;" and I think it is up to him to give his evidence (if he has any) to the contrary. *Ex parte* evidence is at least better than none. Presumably he does admit that tar is cheaper, but he has not the grace to say so. Presumably, also, if it is cheaper, and even not inferior, his case is gone.

I am sorry I cannot follow him in his arguments *re* gas monopolies and tar-distilling "rings." I am sure that an article from him on these matters, as compared with petrol, oil, and bitumen combines, would be amusing, if not instructive; but no doubt he would end up by "cussing" the Britisher for his inability, as compared with the foreigner, to run these things. If "Motorist" will give me the name and address of the tar-distilling "ring," I might try to join it.

If "Motorist" cannot see the humour of the two quotations I gave from his letters, my sympathy goes out to him.

HERBERT W. ROBINSON,
Chairman,
The Midland Tar Distillers, Ltd.

Exchange Buildings,
Stephenson Place,
Birmingham.
Aug. 28, 1925.

Wenham Lighting Corporation.—A company bearing this title has been registered, with a capital of £1000, to carry on business as electrical and gas engineers and factors at No. 184, Gray's Inn Road, London, W.C. 1.

Reconstruction of Footscray Works.—The general reconstruction of the Footscray Works of the Colonial Gas Association is now proceeding; and a contract has been made with West's Gas Improvement Company, Ltd., of Sydney, for an installation of Glover-West vertical retorts. The new carbonizing plant will have a capacity of 1½ million c.ft. per day.

REGISTER OF PATENTS.

Improvements in Ovens for Distilling Fuel. No. 212,274.

KOPPERS, H., of Essen.

No. 5449; March 3, 1924.

Convention date: March 2, 1923.

Introducing their specification, the patentees point out that the practice of using large retort ovens, such as have for long been employed with advantage for making coke, has lately also been adopted for the manufacture of illuminating gas, but the peculiar requirements of the gas industry, more particularly in respect of fluctuating output, have not allowed of directly adopting the coke manufacturer's practice of banking a considerable number of units in series. In coking practice the heating walls of the individual coking chambers are set side by side to make a battery, which is most advantageous in respect of structural strength and heat conservation, but is not advantageous for separately working a single unit or group of units, in view of the effects of expansion due to heat. In the gas industry the method has, accordingly, been adopted of separating groups, consisting of small numbers of units, by means of strong walls of brick and refractory blocks, these having a width equal to about two or three chambers, and being of substantial strength. The longitudinal bonding of the structure extends over all the units.

The object of this invention is to provide improved means for meeting the discrepant requirements of separate expansibility of the individual oven units or groups of units, and of collective and mutual support thereof in the oven structure. This is done by placing each unit or group in a compartment of a single ferro-concrete frame comprising an outer wall and transverse walls, whereby the compartments are formed, and supporting each unit or group in its compartment in such a manner that it can expand in three dimensions. This support is preferably afforded by placing a packing of compressible heat-insulating material around the retorts, in their compartments.

Fig. 1.

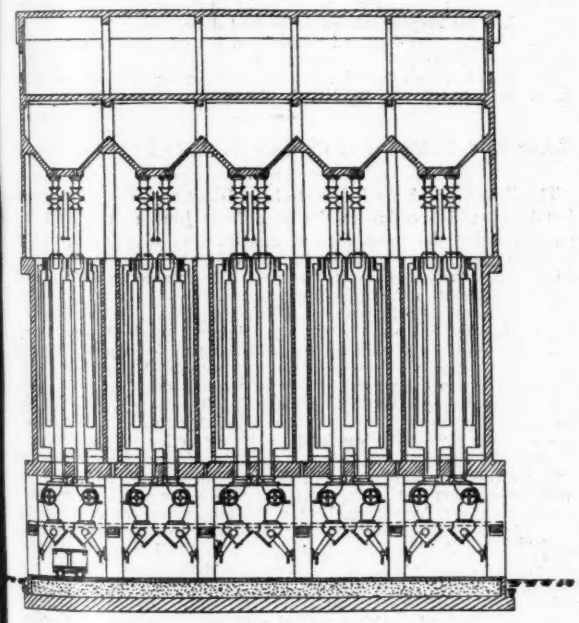
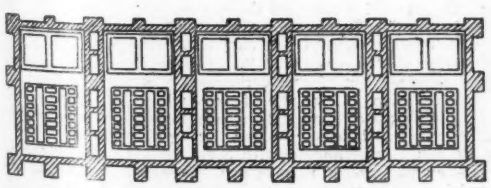


Fig. 2



A Koppers' Chamber Oven Setting.

We reproduce a cross section and a horizontal section of a setting of ovens according to the invention. It will be seen that the retort chambers are grouped in pairs, with appropriate charging and discharging appliances. The oven units thus formed are placed, with clearances around them, in compartments of a ferro-concrete casing, which is a structure adequate to resist external forces. This casing also supports the coal bunkers, &c. The structure is supported on pillars, so that access can be had to the space below the retorts for removing the coke. The spaces between the oven units and the walls of the compartments are packed with heat-insulating material, which performs the double function of transmitting thrust and retaining heat, without preventing expansion of the ovens in relation to the casing in three dimensions.

A suitable heat-insulating material consists of refractory bricks of a composition including kieselguhr, or else highly porous blocks. Such bricks or blocks, when subjected to the temperatures occurring, do not melt, but lose more or less of their internal rigidity, so that they can be slightly compressed and allow of expansion of the oven in all directions.

Inasmuch as, notwithstanding the heat insulation, the walls between the units might be subjected to temperatures higher than are admissible with ferro-concrete, it is advisable to provide these walls with separate cooling channels, through which a draught is created by means of the chimney, so that overheating of the walls is prevented without any great loss of heat.

Apparatus for Distilling Liquor, &c., or Washing Coal Gas.—No. 237,659.

BARRATT, J., of Redcar, GREAVES, W. H., and ASHMORE, BENSON, PEASE, & CO., LTD., both of Stockton-on-Tees.

No. 11,135; May 6, 1924.

This invention relates to apparatus which will distil crude ammonia liquor or benzolized oil, or conversely will act as a gas washer for the extraction of ammonia, benzole, cyanides, naphthalene, and the like, from coal gas or other gases.

The feature is the easily removable bubbling plates, substituting the ordinary hoods or caps. All short circuiting is prevented; and the design is said to bring about a much greater bubbling area for the size of the apparatus used than can be acquired by the existing type of stills or gas washers at present in use. There are no steel or iron bolts or fittings used in the internal parts of the apparatus which are liable to be dissolved when brought in contact with such substances as ammonia or volatile cyanides.

FIG. 1.

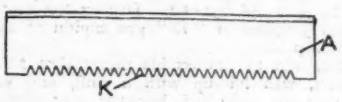


FIG. 4.

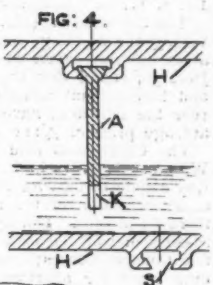


FIG. 2.

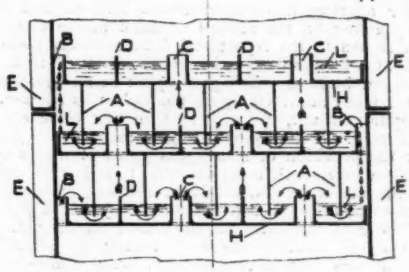
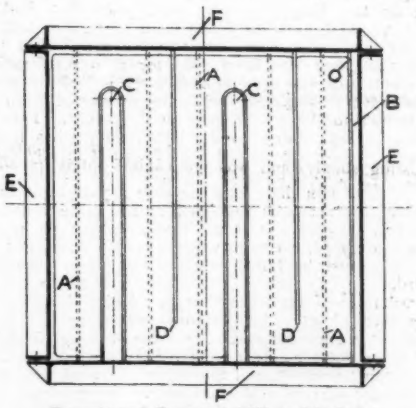


FIG. 3.



Barratt and Greaves' Still or Washer.

The shell of the apparatus is square, and built up of cast-iron flanged plates E and F; a series of cast-iron plates H, which form trays, being inserted at intervals. The two opposite sides F of the apparatus are so made that they can be easily removed to inspect and clean the whole of the interior fittings, although it is only really necessary to remove one side in order to clean thoroughly the whole of the tray plates H, as well as the vapour or gas uptakes C and B. The thin cast-iron plates A, having the lower edge K serrated, provide the necessary bubbling agent, and are secured to the underside of the trays H. These plates, which are machined at an angle at the top, slide into grooves S on the underside of the trays.

A greater bubbling area is thus offered owing to the liquid medium L having to flow along the whole of these plates A, while the steam vapours or gases are forced to pass under the serrations K and

through the liquid the whole of the time, even though the apparatus may be slightly out of level. This is brought about by the cast-iron dividing plates D, which with the gas or vapour uptakes C divide the trays H into troughs.

Cooking Ovens.—No. 237,665.

MARKS, R. G., of Southport, and MARKS, R., of Sheffield.

No. 11,670; May 12, 1924.

This invention relates to a device for use in connection with a gas oven and which, when applied thereto, will act as a condenser for condensing steam as it leaves the oven. It is claimed that it will prevent the deposit of grease on the oven walls and in the room, and will also conserve the heat in the oven and effect a great saving in the amount of gas consumed.

A pipe is adapted to fit the gas outlet pipe of the stove, forming a communication with a condensation chamber through perforations in the pipe; the said chamber having an opening at its lowest portion for the passage of condensation liquid, which may be collected in a vessel situated below the chamber.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for Aug. 26.]

Nos. 20,559-21,099.

HALDEN, C. AB-DER-.—"Continuous distillation of tar." No. 21,003.

HARRIS, J.—"Gaseous fuel." No. 20,807.

HASLAM, Sir A. S.—"Gas-compressors." No. 20,828.

HUMPHREYS & GLASGOW, LTD.—"Apparatus for manufacture of water gas." No. 20,815.

HUMPHREYS & GLASGOW, LTD.—"Production of water gas." No. 20,816.

JONES, E. P.—"Gas-fired furnaces." No. 20,865

PLASSMANN, J.—"Carbonizing fuels." No. 20,626.

SIMPSON, S.—"Coin-freed mechanism for gas meters." No. 21,068.

WOLVERHAMPTON CORRUGATED IRON COMPANY, LTD.—See Jones, E. P. No. 20,865.

MISCELLANEOUS NEWS.

BARNET DISTRICT GAS AND WATER COMPANY.

A Prosperous Business.

The Ordinary Half-Yearly General Meeting of the Company was held on Monday of last week, at the Cannon Street Hotel, E.C.—Dr. J. W. L. GLAISHER, F.R.S. (the Deputy-Chairman), presiding.

The SECRETARY (Mr. E. D. Davey, A.C.A.) read the notice convening the meeting; and the Directors' report and the statement of accounts were taken as read. The report, for the six months ended June 30, stated that the balance standing to the credit of the profit and loss account amounted to £40,248 19s. 6d. During the half-year the Directors have issued £15,000 of "D" gas capital at an average price of £112 1s. 10d. p.ct.

The CHAIRMAN said he had first to express his regret that Mr. William Cash, their Chairman, was laid-up with a chill, and so was unable to be with them that day. He had, however, sent along some indication of the remarks he would have made, had he been there to preside. During and since the war the Company had, for reasons of convenience and economy, been holding their meetings at the London Offices; but the Directors thought that the time had now come for altering this arrangement, and so had called the shareholders together on the present occasion in the Cannon Street Hotel. With regard to the report and balance-sheet, there was not a great deal that he need say. It would be noted that they had made a successful issue of "D" gas capital at an average price of just over £112 p.ct., at which figure the yield was 6¼ p.ct. Glancing at the capital account, it would be seen that there had been an expenditure during the half-year on gas mains of £3891. This had been for the provision of some 3500 yards of mains of various sizes, including a new trunk main into the East Barnet district. In connection with the water undertaking, the expenditure on mains and service pipes had been £2636; about 5400 yards of pipes having been laid, in order to cope with the growth of the district. Coming to the gas revenue account, the only matter to which he need specifically refer was that there had been some diminution in the price of coal, when comparison was made with the corresponding period of the previous year; the average figure being 34s. 9d. per ton, as against 35s. 6d. This advantage, however, had been more than neutralized by the disappointingly small price that had been obtained for tar. With coke they had done as well as last year. As to water, the chief point was that they had supplied 11 p.ct. more water, and that they had been paid for it 9 p.ct. more money. On the present occasion nothing had been placed to reserve; but it would be noted that £2500 had been transferred from the profit and loss account to the contingency fund account. This allocation was balanced by expenditure on the Tyttenhanger headings and the Northaw well, £2589, which had been incurred merely to maintain the existing supply, and was not capital outlay at all. The carry-forward was £244 less than was the case a year ago; but, practically speaking, the accounts remained in the same condition as in 1924. The revenue was almost unaltered, though the price of gas had been reduced by ½d. a therm, which meant a concession of £1500—a fact which must be taken into account when considering the carry-forward.

With regard to the future, the Company had a district which was very rapidly developing; and extensions were called for in both the gas and the water undertakings. A pressure-raising plant had been installed at the gas-works, to cope with the peak loads during the cooking hours on Saturdays and Sundays; and work was proceeding on the designs for certain extensions in the gas-works. In connection with the water supply, the duplicate pumping plant for North Mimms was now being delivered and erected; and foundations were being prepared at Northaw for the machinery which was to be installed. A new boiler was also being placed in the Roestock pumping station. Owing to the difficulty in securing accommodation for the men connected with this station, the Company were erecting cottages nearby—a course which they were also adopting at Tyttenhanger. They had a very large area to supply; and there was no doubt that further extensions of their plant would be required in the future. He need hardly tell them that the business of the Company was a prosperous one. He concluded by moving the adoption of the report and accounts.

Mr. COLIN DOCWRA seconded the resolution, which was, without discussion, put to the meeting and carried unanimously.

On the proposition of the CHAIRMAN, seconded by Mr. ALFRED WOOD, it was agreed that dividends for the half-year ended June 30 at the rates per annum of 10 p.ct. on the "A," "B," and "C" stocks, and 7 p.ct. on the "D" capital gas and water stocks, with a proportionate dividend on the new "D" capital gas stock, all less income-tax, should be paid on Sept. 1.

The CHAIRMAN said it now only remained for him to express the Company's obligations to the staff for the way in which they had carried out their duties during the half-year. The Secretary was always most efficient; while Mr. Haseldine had had great responsibility thrust upon him, owing to the extension work to which he had just referred. This responsibility would increase in the future; but the Board had every confidence in their Engineer, for whose enterprise and ability they were grateful. The staff and employees generally were also loyal and efficient.

Mr. WILLIAM RICHARDS seconded the vote.

Mr. J. F. HASELDINE, M.Inst.C.E., in acknowledging the vote, said he had a good and hard-working staff behind him, who carried out their duties efficiently. Were it not for them, he could not have undertaken his responsibilities as he had done.

Mr. DAVEY also returned thanks, on his own behalf and that of the portion of the staff he represented

The Board were thanked for their services, on the motion of Mr. F. R. SMITH, seconded by Mr. J. MACKWORTH WOOD.

GLASGOW CORPORATION GAS DEPARTMENT REPORT.

The Fifty-Sixth Annual Report of the Glasgow Corporation gas undertaking, which embraces the year from June 1, 1924, till May 31, states that the gross revenue amounted to £1,972,007, and the gross expenditure to £1,606,062, to which is added £166,985 for depreciation written-off capital assets. The balance carried to profit and loss account is thus £198,959.

The Committee had to meet the following requirements during the year: Annuities on stocks, £17,852; interest on borrowed money, &c., £105,842; and sinking fund, £126,459—leaving a deficit of £51,194 on the year's operations. The interest payable to the Corporation loans fund in respect of money borrowed was at the rate of £4 10s. 7d. p.ct., as compared with £4 11s. 8d. p.ct. for the preceding year. The Committee applied £13,531 of the amount at the credit of the sinking fund to the extinction of £4912 10s. of 9 p.ct. and £3250 of £6 15s. p.ct. gas annuity stocks; and the annuities formerly payable upon these stocks now cease to be a charge upon the revenue of the Department. There has also been redeemed during the year, by the application of moneys at the credit of the same fund, a further amount of £100,000 of loans raised under the Glasgow Gas Act, 1910, section 47, and the Glasgow Corporation Order, 1921, section 4. The amount contributed to sinking fund for redemption of annuities and loans was £126,459, to which is added £96, being the accumulations of the unappropriated portion of the sinking fund, making a total addition to the fund of £126,556 during the year. The sinking fund, with its accumulations, now stands at £2,105,106, of which there has been applied in the redemption of borrowed money and annuities £2,087,962.

The quantity of coal carbonized during the year was 668,280 tons, as compared with 691,933 tons for the preceding year—a decrease of 23,653 tons. The average cost of coal carbonized was 23s. 3·24d., being a decrease of 0·770d. against the preceding year. The quantity of coal gas made per ton of coal carbonized was 13,783 c.ft., which, with water gas, gave an average of 14,283 c.ft., as compared with 13,249 c.ft. and 13,594 c.ft. respectively per ton for the previous year. The gas delivered and accounted for during the year amounted to 8,679,445,266 c.ft., as compared with 8,517,531,811 c.ft. for the preceding year—an increase of 161,913,455 c.ft., equal to 1·9 p.ct. The unaccounted-for gas was 9·07 p.ct., as compared with 9·45 p.ct. for the preceding year.

The net sum realized from the sale of coke amounted to £320,084, being £38,460 less than during the preceding year. The total quantity of coke sold was 237,147 tons, compared with 342,949 tons.

The number of ordinary meters in use on May 31 last was 193,912, compared with 193,548 for the previous year—an increase of 364. The number of prepayment meters was 108,096—an increase of 544. Thus the net increase is 908. During the year, 27,347 meters were repaired at workshops. At May 31 there were on loan 162,931 cookers and range fittings, 24,210 grills, and 69,294 boiling burners; and 56,642 gas fires, 5120 radiators, and 1781 water-heating appliances were on hire—a total of 319,987, as compared with 293,504 for the year before. The number of gas engines in use was 723.

LEEDS GAS UNDERTAKING.

Record Quantity of Gas Sold.

In submitting the annual report to the Gas Committee on Aug. 25, Mr. C. S. Shapley, the Engineer and General Manager, stated that over 3000 million c.ft. of gas had been sold during the past year, and that this was a record for the undertaking, being an increase of over 900 million c.ft.

Mr. Shapley reported that the gross revenue for the year amounted to £716,569, and the expenditure to £576,503, leaving a gross profit of £140,066. Out of this £19,281 had to be paid in income-tax, £139,227 in loan charges, and £11,078 in contributions to capital, thus bringing about a deficit on the year's working of £29,520. A sum of £10,260 was deducted from the reserve fund, leaving a net deficiency of £19,260.

The deficit is largely accounted for by the decreased income from residuals. The net income from coke was £97,693, a decrease of £13,460, while there was a decrease of £27,766 in the receipts from the sale of tar. These two items more than cover the total deficit. The price of tar has declined owing to the depressed state of trade and to competition from bitumen for road making purposes. The net income from tar was £24,662, against £52,428 in the previous year. There is also a decrease in the income from ammoniacal liquor; and owing to a drop in price, only £8853 net was received last year from this source, as compared with £11,628.

The report adds that during the year over nine miles of new mains have been laid; the total length now reaching to 1067 miles.

PETROLEUM RESERVES OF AMERICA.

A Committee of eleven of the Directors of the American Petroleum Institute have transmitted to the Federal Oil Conservation Board a voluminous report as to the supply of petroleum in the United States. The document extends to some 300 pages, and its object appears to be to set at rest the prevailing views as to the exhaustion of the oil resources of the States being within measurable distance. The conclusions are as follows:

(1) There is no imminent danger of the exhaustion of the petroleum reserves of the United States.

(2) It is reasonable to assume that a sufficient supply of oil will be available for national defence and for essential uses in the United States beyond the time when science will limit the demand by developing more efficient use of, or substitutes for, oil, or will displace its use as a source of power by harnessing a natural energy.

(3) Current supply and demand cannot stay in balance, since the amount of both supply and demand are constantly changing. Generally, current supply will exceed or be less than current demand, creating surplus or shortage. Either condition will be reflected in price, but price will in time correct either condition.

(4) Petroleum recoverable by present methods of flowing and pumping from existing wells and acreage thus proven consists of 5,300,000,000 barrels of crude oil.

(5) It is estimated that after pumping and flowing there will remain in the area now producing and proved 26,000,000,000 barrels of crude oil, a considerable portion of which can be recovered by improved and known processes, such as flooding with water, the introduction of air and gas pressure, and mining, when price justifies.

(6) Improved methods of deep drilling below oil sands now producing will disclose in many areas deposits not hitherto available, which will be tantamount to the discovery of new fields. Improved methods of producing have been perfected, which will make possible recovery of oil from these lower levels. The limit of deep drilling has not been reached.

(7) The major oil reserves of the United States lie in some 1,100,000,000 acres of lands underlain by sedimentary rocks, and not fully explored, in which geology indicates oil is possible. With extended search, new supplies will be found therein.

(8) The nation has an additional reserve in the vast deposits of oil shale, coal, and lignites, from all of which liquid fuel and lubricants may be extracted if and when the cost of recovery is justified by the price of these products. These deposits are so huge that they promise, under conservative estimates, an almost unlimited supply.

(9) While this report is confined to the petroleum supply and demand within continental United States, the importance of imports cannot be ignored. Countries to the south are known to have large petroleum resources, for the output of which the United States is a natural market, and the supply therefrom must inevitably have its influence on the consumption of American reserves.

(10) The availability of future petroleum supplies from the vast area of land mentioned above depends upon adequate incentives to the exploration which in the past has given the nation a sufficient supply of petroleum, in peace and in war, throughout the history of the oil industry, from its inception in 1859.

There must be: (*a*) Security in the ownership of oil lands and of the right to lease; (*b*) conditions of exploration and development by owners or lessees permitting exercise of initiative, liberty of action, the play of competition, and the free operation of the law of supply and demand; (*c*) prices that will provide a return to producers, refiners, and distributors commensurate with the risks involved and the capital invested.

(11) The supply of petroleum will be made to go much farther through more efficient utilization. Automotive experts state that the mileage of the motor-car per gallon of gasoline may be doubled through structural mechanical changes, when price justifies such changes. Improved mechanism will also result in smaller consumption of lubricants.

(12) Through improved methods, principally the process known as "cracking," the refining branch of the industry has already increased the yield of gasoline, now the major product of petroleum. Through further improvements and extensions, the supply of gasoline will be augmented still further by the cracking of fuel oil. In consequence, the supply of fuel oil will be correspondingly diminished; thus eventually removing fuel oil from competition with coal.

(13) Waste in the production, transportation, refining, and distribution of petroleum and its products is negligible.

GAS REGULATION ACT APPLICATIONS.

The following notices have appeared in the "London Gazette" regarding applications to the Board of Trade under the Act.

SPECIAL ORDER.

Audley Urban District Council.

To authorize the Council to use scheduled land for gas purposes, to borrow money, to regulate the price of gas, &c.

DECLARATION OF CALORIFIC VALUE.

Brentwood Gas Company.—500 B.Th.U., in substitution for 480 B.Th.U. (Dec. 25.)

THE COAL SUBSIDY AND HOW IT WORKS.

Hitherto in the "JOURNAL" there has not been any specific reference to how the subsidy will work which has been granted by the Government to the coal industry for the purpose of giving time to investigate the economics of the industry, with the view of restoring it to a better trading condition, and with advantage to all concerned. From the Coal Industry's Publications Office we have received the following explanation:

In the White Paper explaining the settlement of the crisis in the coal mining industry, the Government recognized that the industry as a whole was, under existing conditions, unable to continue the payment of wages on the scale set forth in the 1924 agreement. The Government therefore "agreed to assist the industry by filling the gap that lies between the level of wages provided by the minimum provisions of the national wages agreement of 1924 and the lower level of wages which would result from the colliery owners' proposals of July 1 last."

The effect upon wages of this settlement is that no workman will receive less than the minimum he would have received under the 1924 agreement, and that if trade improves and his district gets "above the minimum," and ceases to draw the subsidy, his wages will rise above the minimum as under the agreement.

The effect upon the owners is more complicated and less certain. In the first place, the owners as a whole in any district are limited to 1s. 3d. a ton, if that district is in receipt of a subsidy. It is true that individual owners within that district may receive more than 1s. 3d. a ton, just as it is true that in a district that is not in receipt of a subsidy there may be individual owners who are making a loss, and yet will receive no assistance from the Government. But the Government had to apply its terms of settlement and subsidy plan to the existing method of calculating wages in the industry, and that method is not pit by pit but district by district (the miners, indeed, want to make the whole country one "district" for this purpose). One of the principal objects of the scheme was to give to the miners the wages they would have received under the 1924 agreement. It was therefore necessary to continue the same method of calculating wages that had been in force under that agreement.

It has been suggested that the scheme guarantees that the owners' share shall be either 1s. 3d. a ton or 13 p.ct. of the proceeds of the industry. There is no truth in this suggestion. What the owners may actually receive under the scheme depends entirely upon the changes in the selling price of coal. The 13 p.ct. is merely part of a paper calculation to find out, not what the owners receive, but what wages shall be in a future month. For instance, wages in October are calculated by the results of June, July, and August. Suppose that for this period the average monthly proceeds from the sale of coal in a particular district

Were	£1,250,000
And that costs, other than wages, were	250,000
There remains for division	£1,000,000
Of this, 87 p.ct. goes to wages	£870,000
And the owners' share, 13 p.ct., is nominally	130,000
	£1,000,000

We will assume that the owners' share of £130,000 does not exceed 1s. 3d. a ton, and that they are therefore entitled to keep it, if they ever get it. We will also assume that the minimum wage under the 1924 agreement amounts to £950,000, so that the Government subsidy will amount to £80,000—the difference between £870,000 and £950,000. But—and this is the important point—all the above is merely a calculation made at the end of August to find out what wages are to be paid in October. The October wages will have to be paid out of the money received from the sale of coal in October. There is no other source of payment.

Let us, then, suppose that by October the price of coal has fallen still further, as seems very likely, and that instead of being £1,250,000, the proceeds are only	£1,000,000
Costs, other than wages, have to be paid, and are still	250,000
Leaving, to pay wages and to provide the owners' share	£750,000
But the owners are already pledged to pay wages amounting to £950,000, of which they themselves are responsible for	£870,000
Consequently, so far from receiving that £130,000, the owners are actually faced with a loss of	£120,000

which the Government does not make up, because the Government has already done its share of the bargain in making up the £870,000 to £950,000. It will be seen, therefore, that the subsidy scheme contains no guarantee of "profits."

ROMFORD GAS COMPANY.

The Half-Yearly Meeting of the Company was held on Aug. 22—Mr. HENRY JOHNSON, Chairman of Directors, presiding.

The statement of accounts for the half-year ended June 30 showed that, after carrying the revenue profit of £7612 to profit and loss account, there was a total available balance of £9940. Out of this the Directors recommended the following dividends be declared for the half-year: On the original shares 7¼ p.ct., on the "B" shares 5¾ p.ct., and on the preference shares 3 p.ct., all less income-tax, which, together with the amount required for reserve fund, debenture interest, and other charges, would absorb £7754, and leave £2185 to be carried forward. The sale of gas showed an increase of 7·53 p.ct. over the corresponding period of 1924. In order to clear-off the bank overdraft and to meet capital expenditure, the Directors issued £34,300 5 p.ct. debenture bonds on Jan. 1 last, at £99 p.ct.

The CHAIRMAN, moving the adoption of the accounts, said that the sale of gas had increased by nearly 10 million c.ft. The pressure from the new holder, which was brought into operation in May, had made working easier. Considerable mainlaying had taken place during the half-year. The capital extensions contemplated at the time of their new Order under the Gas Regulation Act had made the progress which had been expected up to this time. There now remained to be done extensions of retorts, purifiers, and other things, to cost probably £60,000; and they could not go on much longer without a further issue of capital. The Directors acknowledged with the greatest satisfaction the successful work of Mr. Wright, the Engineer and Manager, in the development of the works; and of Mr. Berridge, the Secretary, for the way in which he was pushing the sales department, and for the constant attention to the wants of the consumers in every direction. In these remarks he wished to include the staff in general. Additional services and the replacement of old ones were being carried out in every direction; 526 new consumers had been connected during the 12 months, and 976 new appliances had been supplied. Building was going on at a rapid rate in many parts, and, though in some cases they might not get all the lighting, yet they all formed new consumers for fires, cooking, water heating, &c. An increased consumption of gas was to be found in every department, and was especially prominent in the prepayment section.

The report and accounts were adopted.

Hastings and St. Leonards Gas Company.—At the half-yearly meeting of the Company, which will be held to-morrow, Sept. 3, the Directors will recommend the payment of the following dividends (less income-tax) for the half-year ended June 30: On the 5 p.ct. converted stock, £6 15s. p.ct. per annum; on the 3½ p.ct. converted stock, £5 5s. p.ct.; and on the 5 p.ct. additional stock, £6 4s. p.ct.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Aug.* 31.

The demand for pitch is not too brisk; but the price does not show any sign of weakening, and is steady at from 40s. to 42s. 6d. per ton f.o.b. makers' works.

Road tar continues to be sent out in fair quantities, and the demand should undoubtedly continue for some weeks yet, given fine weather, as there is a considerable amount of road work still to be done.

Creosote is steady at about 6½d. per gallon, in bulk. Exports are being maintained; 7,010,827 gallons having been shipped in July, making a total of 27,860,516 gallons over January-July this year, as against 24,024,640 gallons for the corresponding period last year.

Phenol is firm at from 4¾d. to 5d. per lb.

Pyridine is in strong demand, and is firm at 20s. per gallon.

Tar spirits are also in request, and pure benzole and pure toluole are firm at 2s. 1d. to 2s. 2d. per gallon, and 95/160 solvent naphtha at 1s. 9d. to 1s. 10d. per gallon.

Tar Products in the Provinces.

Aug. 31.

Markets for tar products are practically the same as last week. There is little or no business being done, and markets continue dull.

The pitch market remains in about the same position. The majority of manufacturers on this side are asking 40s. f.o.b., against which Continental buyers indicate they are receiving offers at 38s.

Creosote is quiet, and home business is being done at existing prices. There is little or no demand for export.

Water white products remain firm all round.

Carbolic and cresylic are neglected, and naphthalene is difficult of sale.

The average values for gas-works products during last week were: Gas-works coal-tar, 25s. to 30s. Pitch, East Coast, 37s. 6d. to 38s. 6d. f.o.b. West Coast—Manchester, 32s. 6d. to 33s. 6d.; Liverpool, 33s. 6d. to 34s. 6d. Clyde, 36s. 6d. to 37s. 6d. Benzole, 90 p.ct., North, 1s. 7½d. to 1s. 8¼d.; crude, 65 p.ct., at 120° C., 1s. to 1s. 1d., naked at makers' works; 50-90 p.ct., naked, North, 1s. 7½d. to 1s. 8¼d. Toluole, naked, North, 1s. 6½d. to 1s. 7½d., nominal. Coal-tar crude naphtha, in bulk, North, 7½d. to 8¼d. Solvent naphtha, naked, North, 1s. 4½d. to 1s. 6d. Heavy naphtha, North, 1s. to 1s. 2d. Creosote, in bulk, North, liquid, 5⅝d. to 5¾d.; salty, 5½d. to 5¾d.; Scotland, 5⅝d. to 5¾d. Heavy oils, in bulk, North, 6½d. to 6¾d. Carbolic acid, 1s. 4d. to 1s. 5d. prompt. Naphthalene, £11 to £14; salts, £4 to £5, bags included. Anthracene, "A" quality, 2½d. per minimum 40 p.ct., purely nominal; "B" quality unsaleable.

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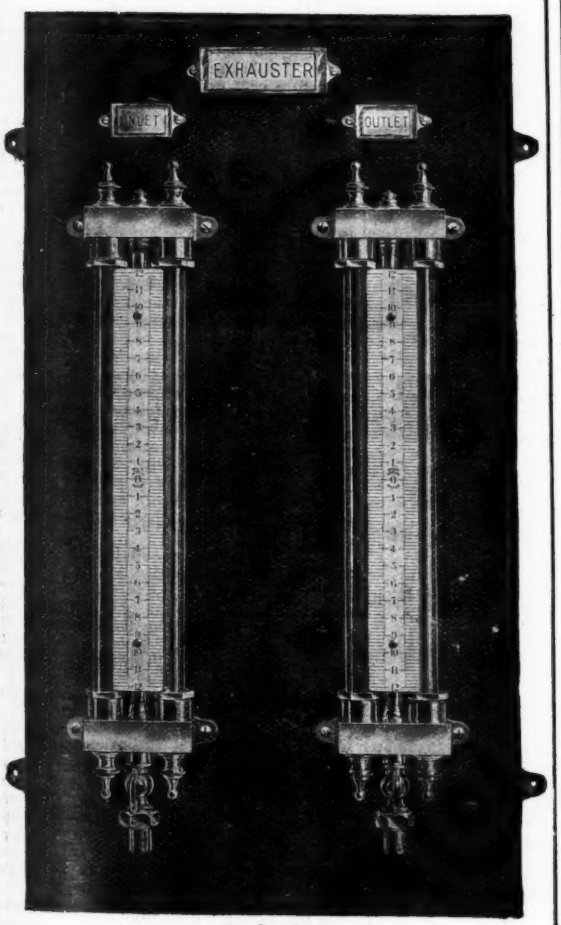

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NORTH-EAST COAST COAL TRADE.

From our Own Correspondent.

In the past week a distinctly more cheerful tone has come into the market. There has been more inquiry than for some time past, and this encourages the hope that prices have reached a level which will attract business in competition with other sources of supply on the Continent. There has been no great increase in actual business as yet; but the better-class collieries have been able to book a certain number of orders, and it is hoped that September may see the more active inquiry developing into actual increased demand for export.

There is no prospect at present of any material rise in prices, as the production could be increased considerably at current levels if there was sufficient trade to go round.

Northumberland steams, under the better demand, are much steadier in tone. Durham gas makes have not been very active, but seasonal demand may shortly have its effect. Nominal quotations are about 17s. 6d. for Wear Specials, and 17s. 3d. for best qualities. Seconds are still plentiful at 14s. 3d. to 14s. 9d. No demand for coking makes has as yet developed, and they are called 13s. 9d. to 14s. for unscreened. Orders for best bunkers have been more plentiful at 14s. 6d. to 15s.

COAL TRADE IN THE MIDLANDS.

From our Local Correspondent.

The week that has elapsed since the date of my last report has made no appreciable difference in the position. While the transitory factors which have distorted the market are gradually righting themselves, local difficulties are aggravated in some respects. The industrial demand, forestalled as it was in a good many directions, will not recover its balance yet awhile, unless consumptive requirements develop more rapidly than present prospects suggest. Collieries generally are not stopped for more than about a day a week, but they are producing more slacks, beans, and nuts than they can find a market for. Selling rates suffer accordingly.

The call for good grade house coals is fairly well sustained. Some of the collieries have good order books. But there is not the same activity of demand for low quality domestic fuel. There is no question of exacting extras now, albeit producers are very chary about any alteration of their list prices with the expectation of the autumn stimulus before them.

The irregularities which have latterly upset the distribution of gas coal will not disappear till the reduction of stocks is accelerated by a larger demand for lighting, heating, and power supplies; but this may be reckoned on before many weeks have passed.

YORKSHIRE AND LANCASHIRE COAL TRADE.

From our Local Correspondent.

Trade continues to be very quiet. In anticipation of a stoppage, extra quantities were taken by buyers during July. These were placed in stock and not consumed, and the consequence is that now there is very little demand for any class of coal. Both industrial concerns and householders are generally well stocked. As most gas-works make contracts about June or July, they are fully covered without being affected quite as much by fluctuations of the market, and there is but small request for spot lots.

Collieries are still working short time; very few being employed more than three days, or at best four days, a week.

The export trade remains inactive, foreign competition being keenly felt. Germany appears to have large stocks, and offers freely in various European countries. France and Belgium seem to be producing quite as much, if not more, coal than is needed for home requirements, and the surplus is exported.

The immediate outlook is not promising, for there is small prospect of any improvement in the industrial position, and colder weather must be awaited before the household demand begins automatically to increase.

The Humber bunker and export prices (f.o.b. usual shipping ports) are as follows. South Yorkshire—Hards, Association, 18s. 6d.; screened gas coal, 17s. 6d. to 18s.; washed trebles, 17s. 6d.; washed doubles, 16s. to 16s. 6d.; washed singles, 15s. to 15s. 3d.; washed smalls, 11s. 9d.; unwashed doubles, 15s.; rough slack, 10s. to 10s. 3d.; and smithy peas, 16s. 6d. to 18s. 6d. West Yorkshire—Hartleys, 16s. 9d. to 17s. 6d.; screened gas coal, 17s. to 17s. 6d.; washed trebles, 17s.; washed doubles, 15s. to 15s. 6d.; washed singles, 13s. 6d. to 14s. 6d.; washed smalls, 10s. 9d. to 12s.; unwashed trebles, 16s. 6d.; unwashed doubles, 12s. to 13s.; rough slack, 10s. 6d.; and coking smalls, 10s. Derbyshire and Nottinghamshire—top hards, 19s. 3d. to 20s. 6d.; unwashed doubles, 13s. 6d. to 14s.; and rough slack, 10s. to 10s. 6d. Yorkshire, Derbyshire, and Nottinghamshire—screened steam coal, 14s. 6d. to 17s.; gas coke, 18s. to 22s.; and furnace coke, 18s. 6d. to 19s. 6d. per ton.

Bodmin Gas Consumers' Company, Ltd.—Presiding at the sixty-first annual meeting of the Company, the Chairman (Mr. H. D. Foster) said he thought the position was on the whole satisfactory. The report and balance-sheet were adopted, and a recommendation of the Directors that a dividend of 2s. per share, free of income-tax, was also endorsed. Thanks were accorded the Chairman and Directors, the Manager (Mr. R. Greenaway), and the Secretary (Mr. W. J. Hender).

Wellingborough Gas Light Company, Ltd.—The profit for the half-year ended June 30, after providing for interest and income-tax, amounts to £3779. This, added to the balance brought forward from last account, makes an available balance of £9115. The Directors recommend that out of this sum dividends of 7½ p.ct. on the original shares and 6 p.ct. on the additional shares (less income-tax) be declared for the half-year. The payment of dividends and tax thereon will leave a balance of £5268 to be carried forward.

STOCK MARKET REPORT.

THE event of the week was undoubtedly the announcement of the terms of settlement, subject to the approval of the respective Parliaments, of the Anglo-French debt. While there has been a good deal of criticism, especially in the United States, there seems, at the time of writing, every prospect of the terms being ratified.

One result of the settlement was a general hardening in the European reconstruction loans, particularly Greek 7 p.ct. French 4 p.ct. and 5 p.ct. Rentes rose 2⅜ and 2¾ respectively. It is possible that the Stock Exchange was as usual a little too optimistic, and prices may ease a little during the current week.

Business generally on the Exchange was brisk, and a fairly heavy account was reported. Gilt-edged stocks were slightly weaker. Home Rails were more cheerful, and Great Western and London Midland and Scottish both rose 1¼. Among the Industrials there has been some support for various Cement issues. Oils were depressed, doubtless on the news from America of cuts in the prices of crude and petrol.

Issue.	Share.	When ex-Dividend.	Dividends. Prev. Hf.Yr.	Dividends. Last Hf. Yr.	NAME.	Quotations. Aug. 28.	Rise + or Fall − on Week.	Transactions Lowest and Highest Prices.
£			% p.a.	% p.a.				
171,978	Stk.	Aug. 13	5	5	Aldershot 5 p.c. max. C.	75—78	..	
295,492	,,	,,	5	5	Do. 4 p.c. Pref.	69—74	..	76
1,351,868	,,	Apl. 2	4	4	Alliance & Dublin Ord.	63—65	..	..67
374,000	,,	July 9	6½	6½	Do. 4 p.c. Deb.	60—65	..	64½—
300,000	1	May 7	4	4	Bombay, Ltd.	½—1	..	..
170,000	10	Aug. 13	1/7½	1/7½	Bournemouth 5 p.c.	12—13	..	19/6
425,050	10	,,	8½	8½	Do. B 7 p.c..	12—12½	..	..
150,000	10	,,	7	7	Do. Pref. 6 p.c..	11—12	..	..
50,000	Stk.	June 25	6	6	Do. 3 p.c. Deb..	56—59	..	..
1,162,025	,,	,,	3	3	Do. 4 p.c. Deb..	77—80	..	..
992,045	,,	July 9	4	4	Brentford A Con.	93—98	..	..
990,500	,,	,,	6 5/6	6 5/6	Do. B New	93—98	..	93—94½
76,000	,,	,,	6½	6½	Do. 5 p.c. Pref.	94—97	−1	93
306,690	,,	June 11	5	5	Do. 4 p.c. Deb.	75—80	..	94
181,337	,,	,,	4	6	Do. 6 p.c. Rich. Red. Deb.	100—105	..	..
214,740	,,	Aug. 27	2½	12	Brighton & Hove Orig.	161—166*	..	..
1,244,200	,,	,,	9½	9	Do. A Ord.	119—122*	−4	..
1,287,500	,,	July 23	8	5	Bristol 5 p.c. max..	89—91a	−3	..
855,000	,,	Mar. 19	7	7	British Ord.	103—110	..	..
100,000	,,	June 25	4	4	Do. 7 p.c. Pref..	120—125	..	109
120,000	,,	,,	6	8	Do. 4 p.c. Red. Deb.	71—76	..	120½
100,000	10	May 21	4½	4½	Cape Town, Ltd.	6½—7½	..	..
150,000	Stk.	Apl. 23	4½	4½	Do. 4½ p.c. Pref..	5½—6½	..	7½
626,860	,,	June 25	6	6	Do. 4½ p.c. Deb..	69—74	..	..
237,860	,,	July 23	4½	4½	Cardiff Con. Ord.	98—101	..	..
157,150	,,	Aug. 13	7½	7½	Do. 7½ p.c. Red. Deb.	101—104	..	..
1,513,280	,,	July 23	6½	5	Chester 5 p.c. Ord.	88—93b	..	..
360,000	,,	,,	5/14/8	5½	Commercial 4 p.c. Cap.	80—85	..	..
475,000	,,	June 11	5⅜	5/3/4	Do. 3½ p.c. Cap.	80—85	..	80
800,000	,,	14 Jan. 15	3	3	Do. 3 p.c. Deb.	56—59	..	..
300,000	,,	June 11	—	—	Continental Union, Ltd.	35—40	..	..
660,000	,,	Aug. 13	7	7	Do. 7 p.c. Pref.	88—91	..	57½—58½
284,975	,,	,,	6½	6½	Croydon sliding scale	96—100	..	36½—37½
1,492,270	,,	Aug. 13	5	5	Do. max. div.	81—84	..	..
1,155,000	,,	June 25	9	6	Derby Con.	107—109c*	..	..
1,002,180	10	July 23	4	4	Do. Deb.	74—76c	..	82
16,460,070	Stk	Aug. 13	6	6	European, Ltd.	6½—7½	..	106½—107½
2,600,000	,,	,,	5½	5½	Gas Light & Coke 4 p.c. Ord.	80—82	+½	..
4,062,235	,,	,,	3½	3½	Do. 3½ p.c. max.	60—63	..	7½—7⅝
4,761,930	,,	June 11	4	4	Do. 4 p.c. Con. Pref.	77—80	..	80—81
130,000	,,	,,	3	3	Do. 3 p.c. Con. Deb.	58—61	..	60½
42,000	,,	—	10	10	Do. 10 p.c. Bonds	..	..	77½—78½
82,500	,,	Mar. 19	7½	7½	Do. 7½ p.c. Ilford Deb.	..	..	..
258,740	,,	,,	6½	6½	Hastings & St. L. 5 p.c. Conv.	92—97	..	..
70,000	10	,,	5½	5½	Do. 3½ p.c. Conv.	73—78	..	..
86,600	Stk.	May 7	10	10	Hongkong & China, Ltd.	17½—18½	..	76
1,976,000	,,	Aug. 13	10	10	Hornsey 7 p.c.	132—137	..	..
226,170	,,	May 21	10	10	Imperial Continental Cap.	148—153	..	..
235,242	,,	Aug. 13	59	59	Do. 3½ p.c. Red. Deb.	70—73	+8	..
2,127,340	,,	Aug. 13	3½	3½	Lea Bridge 5 p.c. Ord..	94—99	..	147½—152
600,000	,,	Aug. 13	6½	6½	Do. 7 p.c. Red. Pref.	82½—83½b	..	..
165,736	,,	Mar. 19	5½	5½	Liverpool 5 p.c. Ord..	104—106b	..	..
63,480	,,	Aug. 27	7	7	Do. 3 p.c. Deb..	118—128*	−4	104½
75,000	5	June 25	8	8	Maidstone 5 p.c. Cap.	55—60	..	..
541,920	Stk.	June 25	3	3	Do. 3 p.c. Deb..	4—4½	..	..
2,061,315	,,	June 11	3	3	Malta & Mediterranean	65—69	..	4½
300,929	,,	Aug. 13	4	4	Montevideo, Ltd.	7½—7¾d*	..	66½
329,705	,,	,,	5	5	Newcastle & Gateshead Con.	75½—76½d*	−½	71½
15,000	,,	June 21	4	4	Do. 4 p.c. Pref.	66—68d	..	..
75,940	,,	Aug. 27	3½	3½	Do. 3½ p.c. Deb.	—*	..	..
300,000	Stk.	,,	12	12½	North Middlesex 10 p.c.	—*	..	..
188,120	,,	May 7	8⅝	8⅝	Do. 7 p.c.	100—105	..	..
60,000	50	June 25	9	7	Oriental, Ltd.	108—113	..	103—104½
100,000	50	Aug. 27	7¼	7¼	Plym'th & Ston'house 5 p.c.	93—96*	..	..
2,289,909	1	,,	14	14	Portsea Island B	90—95*	−3	..
302,600	100	,,	13	13	Do. C	8/9—9/9	−3	..
600,000	Stk.	June 2	—	—	Primitiva Ord.	78—80	..	9/—9/6
193,744	,,	July 23	4	4	Do. 4 p.c. Red. Deb..	62—64	..	..
264,496	,,	June 25	4	4	Do. 4 p.c. Red. Deb. 1911	63—65	..	..
150,000	10	,,	4	4	Do. B. Aires 4 p.c. Rd. Db.	63—65	..	63½
125,000	50	Mar. 19	6	6	Do. R'r P'te 4 p.c. Rd. Db.	7½—8½	..	..
270,000	Stk.	July 1	5	5	San Paulo 6 p.c. Pref.	42—45	..	..
419,968	,,	Mar. 19	5½	5½	Do. 5 p.c. Red. Deb.	103—104e	..	42½—43½
2,147,000	,,	,,	5½	5½	Sheffield A	103—104e	−1½	..
90,000	10	June 11	6	4	Do. B	103—104e	−1½	..
6,609,893	Stk.	Aug. 13	6½	4	Do. C	7—9	..	..
1,395,445	,,	July 9	3	3	South African	90—92	..	..
734,000	,,	Mar. 5	6½	6½	South Met. Ord.	57—60	..	91—91½
91,500	,,	Aug. 13	8½	8½	Do. 3 p.c. Deb.	102½—104½	..	..
2,187,795	,,	July 23	6½	6½	Do. 6½ p.c. Red. Deb.	132—133d*	..	..
368,837	,,	June 25	5	5	South Shields Con.	92—97	..	..
647,740	,,	May 7	5	5	South Suburban Ord. 5 p.c.	95—98	..	94½—95
121,275	,,	June 25	4	4	Do. 5 p.c. Deb.	80—83	..	..
250,000	,,	Aug. 27	7	7	South'mpt'n Ord. 5 p.c. max.	70—75	..	..
200,000	,,	June 25	6½	6½	Do. 4 p.c. Deb.	100—102*	−½	..
120,000	,,	July 23	8	7½	Swansea 7 p.c. Red. Pref.	101—103	+1	..
882,275	,,	,,	6½	5½	Do. 6½ p.c. Red. Deb.	113—116	..	..
150,000	,,	July 9	—	28/4	Tottenham District A 5 p.c.	87—92	..	..
181,255	,,	June 11	4	4	Do. B 3½ p.c.	103—105	..	..
238,251	,,	Mar. 19	5	5	Do. 5½ p.c. Pref.	76—79	..	..
197,294	,,	Aug. 27	6½	6½	Do. 4 p.c. Deb.	74—76d	..	..
88,330	,,	,,	5	5	Tynemouth Con. and New	92—98*	−2	..
91,800	,,	,,	6½	6½	Uxbridge, Maidenhead, &	93—98*	−2	..
30,000	,,	July 9	9½	8½	Wycombe 5 p.c..	88—93*	−2	..
255,636	,,	,,	7½	7	Do. 5 p.c. pref.	125—130	..	..
392,955	,,	,,	6/9/6	5/19/0	Do. 5 p.c. Maidenh'd	107—112	..	..
352,000	,,	,,	7⅜	6½	Wandsworth, Wimbledon, and Epsom—	93—95	..	..
98,000	,,	,,	7⅜	7½	Wandsworth A 5 p.c.	100—105	−1	..
88,416	,,	June 25	5	5	Do. B 3½ p.c.	109—112	..	..
					Do. C and New	56—59	..	..
					Wimbledon 5 p.c.			
					Epsom 5 p.c..			
					3 p.c. Deb.			

Quotations at:—*a*,—Bristol. *b*,—Liverpool. *c*,—Nottingham. *d*,—Newcastle. *e*,—Sheffield. * Ex. div.

In the Gas Market the changes in the quotations were unimportant, with the exception of a rise of 8 points in the Imperial Continental to 148-153. Sheffield three stocks fell away 1½ points, and Wandsworth (Wimbledon) stock 1 point. Among the provincial group there are quite a number of attractive stocks. Hastings and St. Leonards 5 p.ct., Hornsey 7 p.ct., Maidstone 5 p.ct., Plymouth 5 p.ct., and Wandsworth "A," "B," Wimbledon, and Epsom stocks all show a return at present prices of over 7 p.ct., while there are a number of stocks which realize from 6½ to closely approaching 7 p.ct. From various companies it is satisfactory to hear that not only are the prices of the residual products steadying, but there are signs of improvement. Sulphate of ammonia is selling ahead at a slightly better price per ton. Stocks of coke are also being steadily reduced; and it would appear that the pessimistic views of the results of the year which were taken a few months ago may generally be discounted.

The following transactions were recorded during the week:

On Monday, Alliance and Dublin 64½, 64⅝, British 7 p.ct. preference 120½, Gas Light and Coke 80⅛, 80¼, 80⅜, 80⅝, 81 *ex* div., 4 p.ct. preference 77½, 78½ *ex* div., Hastings and St. Leonards 3½ p.ct. converted 76, Primitiva 9s., 9s. 1½d., 9s. 6d., 4 p.ct. (Buenos Ayres) debenture 63½, South Metropolitan 91 *ex* div., South Suburban 5 p.ct. 95. Supplementary prices, Cambridge University and Town 5 p.ct. debenture 95⅛, 95⅞.

On Tuesday, Brentford "A" 93, Commercial 3 p.ct. debenture 58½, Gas Light and Coke 80½, 80¼, 80⅜ *ex* div., 3½ p.ct. maximum 60⅞ *ex* div., 4 p.ct. preference 78 *ex* div., Imperial Continental 147½, 150, 151, Primitiva 9s., South Metropolitan 91¼ *ex* div. Supplementary prices, Derby 5 p.ct. ordinary 106½, 107½.

On Wednesday, Commercial 3½ p.ct. 80, 3 p.ct. debenture 57½, European 7⅛, Gas Light and Coke 80, 80½, 80⅝, 80⅜, 81 *ex* div., 4 p.ct. preference 77¾ *ex* div., Imperial Continental 150, 151, 152, Liverpool 7 p.ct. preference 104½, Primitiva 9s., 9s. 3d., San Paulo 5 p.ct. debentures 42⅜, 43½, South Metropolitan 91 *ex* div., South Suburban 5 p.ct. 94½. Supplementary prices, Kingston-upon-Thames 103½, 104, Uxbridge 4 p.ct. debenture 68½.

On Thursday, Aldershot "C" 76, Alliance and Dublin 66, 67, Brentford "A" 94⅜, "B" 93, Cape Town and District 7½, Continental Union 38¼, 38½, European 7⅜, Gas Light and Coke 80½, 80⅛, 80¾, Malta and Mediterranean 85s., Oriental 103, 103½, 104½, Primitiva 9s. 4½d.

On Friday, Alliance and Dublin 65½, Bombay 19s. 6d., Brentford "A" 93, "B" 93, 5 p.ct. preference 94, British 109, Commercial 4 p.ct. 80, Croydon maximum dividend 82, Gas Light and Coke 80, 80½, 80⅝, 80⅞, 4 p.ct. preference 77½, Imperial Continental 152, Montevideo 66½, Primitiva 9s., 9s. 4½d., South Suburban 5 p.ct. 95.

Gold withdrawals from the Bank of England were heavier than usual last week, so that the hopes entertained in some quarters of a further reduction in the Bank Rate did not materialize. The heavy export of gold was to an extent anticipated, and should not unduly disturb the Money Market. The average rate at which Treasury Bills were allotted —£3 16s. 3·65d. p.ct., nearly 1s. 1d. up on the previous week—was expected, and confirms the harder tone noticeable in the discount market.

On the Foreign Exchange Market the most noticeable feature at the end of the week was the easier tendency of the New York rate. The quotation fell to 4.85⅛, but stiffened to 4.85 1/16 at the close. The Paris cheque moved narrowly, and finished at 103.35. Belgian francs were slightly cheaper on the day. Italian lire fluctuated widely, and the closing figure of 129⅜ showed a fall of 1⅛. Swiss and Dutch exchanges both moved against this country.

In the open market gold remained nominally 84s. 11½d. per oz. Silver rose earlier in the week, and finished slightly higher at 32 7/16.

The Bank Rate is 4½ p.ct., to which it was reduced from 5 p.ct. on Aug. 6. Bankers' deposit rates are 2½ p.ct. The deposit rates of the discount houses are 2½ p.ct. at call and 2¾ p.ct. at notice.

TRADE NOTES.

National Gas Engine Company.

The Company removed to new offices at Australia House, Strand, W.C. 2, on Sept. 1. Their telephone numbers will remain the same as at present—viz., Central 7984 and 7085.

Pifco, Ltd.

This Manchester firm have published a folder describing the advantages of the "P.A.L." globes which they manufacture. It is claimed that by the use of these globes 33 p.ct. more light is utilized than when glass globes are employed.

Staveley Coal and Iron Company, Ltd.

This Chesterfield firm have published a booklet describing their Devonshire works blast-furnace plant, which has an annual output of 265,000 tons. The surplus gas from these furnaces is utilized to drive a 5000-KW. gas-driven alternator; the gas engine being of the double-tandem type.

"Classic" Grates.

For many reasons, the new issue by Messrs. John Wright & Co. of their latest "Classic" grates list is certain to be received with exceptional interest. This booklet gives a comprehensive idea of the distinctive character and exceptional craftsmanship which have placed the "Classic" gas grates in a class by themselves, and particularly with regard to the colour finishes, the richness of which has long been admired. In addition to their well-known "Classic" designs listed again, Messrs. John Wright & Co. have included two new and attractive models known as the "Tasso" and the "Dante" (with dogs). These are finished in "egg-shell black," "art copper," and "armour bright," and the former can also be obtained in "fine cast." Another feature of this attractive list is the inclusion of the new "Chiltern" gas mantle register, specially constructed for housing schemes, which is to be commended for its smart appearance and its inexpensiveness. Those who wish to familiarize themselves with the high character, value, and variety of the above products are invited to write for a copy of this booklet to Dept. "A," Messrs. John Wright & Co., Essex Works, Aston, Birmingham.

Cork Gas Company.

The ordinary general meeting of the Cork Gas Consumers' Company was held on Aug. 28—Mr. William B. Harrington, Chairman, presiding. The annual report, submitted by the Secretary (Mr. Richard Healy), stated that, compared with the corresponding period in 1924, there had been a satisfactory increase in the quantity of gas sold, though this was not fully reflected in the rental account, owing to the reduced price charged during the half-year. There had been a considerable falling-off in the return from residuals. The balance of profit and loss was £5034. The Chairman, moving the adoption of the report, said that the consumption of gas showed an increase of 2·92 p.ct. over the corresponding period of 1924, which was the previous highest on record. During the half-year they fixed 275 stoves, making the total number fitted 20,177. Sir J. Scott moved that a dividend of 8 p.ct. be declared for the half-year ended June 30; and this was agreed to.

Gas-Works at Whaley Bridge.—The Chapel-en-le-Frith District Council have decided not to take any steps against the local Gas Company's proposal to build a new gas-works at the entrance to the Goyt Valley, a famous Derbyshire beauty spot. The Council think that the benefits likely to accrue to the ratepayers of the district who are consumers of gas greatly outweigh any assumed disadvantages.

Smoke Abatement.—The question of smoke abatement was considered at the summer school organized by the National Union of Societies for Equal Citizenship at St. Hilda's Hall, Oxford, on Aug. 29. Miss Marian Fitzgerald, of Manchester, joint author of "The Smokeless City," said that there were two sides of the problem which must be attacked at once. There was domestic smoke and industrial smoke. To deal with the former there had to be a change in long-established habits. Domestic smoke did not at present come under the law, but it was fairly well known that it was responsible for a very large proportion of the pollution from which they suffered. Much of the trouble in this country had been caused because coal had been too plentiful and too cheap, and it had been abused. Solid smokeless fuel was regarded by some as the one panacea; but that must not be believed. Even when there was solid smokeless fuel, it would not be economical to use it for cooking.

Salford Gas Prices.

Subject to the sanction of the Council at their meeting next month, the Salford Gas Committee propose to increase the price of gas to ordinary and prepayment meter consumers by 4d. per 1000 c.ft. The deficit on last year's working was something over £20,000. The net decrease in receipts from residuals was £14,888; the total net decrease in income from sales of gas, residual products, and rental of stoves being £28,222. Last year the Committee made a contribution in aid of rates of £12,000, and they are committed to a similar payment this year. The gross profits for the last three years, ended March 31 in each case, were: 1923, £157,554; 1924, £101,116; 1925, £67,006. The last alteration in the price of gas in Salford was in July, 1924, when the figure of 3s. 10d. was reduced to 3s. 6d. per 1000 c.ft., so that if the Council approve the recommendation that will be submitted next month, the price will revert to what it was thirteen months ago.

Nottinghamshire Collieries and Gas Supplies.—The Bolsover Company and the New Hucknall Company, representing two of the largest colliery undertakings in Nottinghamshire, have offered to supply to the Mansfield Corporation gas in bulk from their bye-product plants at a price lower than that at which the Corporation can produce it at their own gas-works. No decision in relation to the matter has yet been arrived at by the Corporation.

Big Gas Main at Tottenham.—The laying of a 48-in. main for the Tottenham District Light, Heat, and Power Company has given employment to about 250 men, and, with connections, is involving an outlay of nearly £65,000. The new main, which starts in Willoughby Lane, reaches the new road from Harringay to Wormley at a point near the Edmonton Council allotments. The work was commenced towards the end of February, and is now nearing completion. The contractors are Messrs. William Press & Son, of Westminster.

Morpeth Gas Company.—The annual report of the Company states that the gross profit for the year amounts to £2779, which, with £793 brought forward, gives an available sum of £3573. The Directors recommend dividends of 6 p.ct. for the year on the preference shares (less income-tax), of which an interim dividend of 3 p.ct. was paid in February last; and 6 p.ct. (free of tax) on the ordinary shares, of which an interim dividend at the rate of 2½ p.ct. was paid in February last. A balance of undivided profits of £827 is carried forward.

Exhibit of Mantle-Making at Castleford.—At the Castleford Trades Exhibition held from Aug. 21 to 28, the Ramie Company (Branch of Lighting Trades, Ltd., Nos. 51 to 57, Garratt Lane, London, S.W. 18) gave demonstrations of the knitting and burning-off operations in the manufacture of "Zeimar" gas mantles. The exhibit was situated on the stand of the Castleford Gas Company; and in addition to the working machinery there was on view a full range of the materials used in manufacture, and specimens showing the progressive stages of both upright and inverted types from the raw ramie grass to the finished mantle.

Price of Gas in Manchester.—It is recommended that the price of Manchester gas should be advanced by 4d. per 1000 c.ft., or 0·89d. per therm, after the meter readings on Sept. 25 have taken place. Since March of last year the price has been 3s. The matter will come before the Manchester City Council to-day. The necessity for an increase is due to the loss of revenue from the sale of bye-products. The reduction in the price of gas by 3d. in March, 1924, together with the smaller revenue from the residuals, has cost the Department £155,000. The Gas Committee feel that there is no wise alternative to an increase in the price.

Woking District Gas Company.—On Monday next, Sept. 7, the Directors will submit their report and statement of accounts for the half-year ended June 30. In comparison with the half-year ended June 30, 1924, the quantity of gas sold shows an increase of 5,578,137 c.ft., or 9·75 p.ct.; but receipts from the sale of residual products show a decrease of £1844. The profit on the half-year's working, after charging interest on debenture capital and temporary loans, and writing £1690 off the suspense account, amounts to £2310, which, with £3024 brought forward from the previous half-year, makes a disposable balance of £5334. It is recommended that dividends for the half-year be paid at the following rates (less income-tax) on the ordinary and preference stocks, which will absorb £2297 6s., leaving £3037 to be carried forward: On the "A" and "B" ordinary stocks, 6 p.ct. per annum; on the "C" preference stock, 5 p.ct.; on the 5 p.ct. redeemable preference stock, 5 p.ct.; and on the 8 p.ct. redeemable preference stock, 8 p.ct.

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